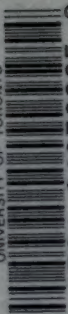
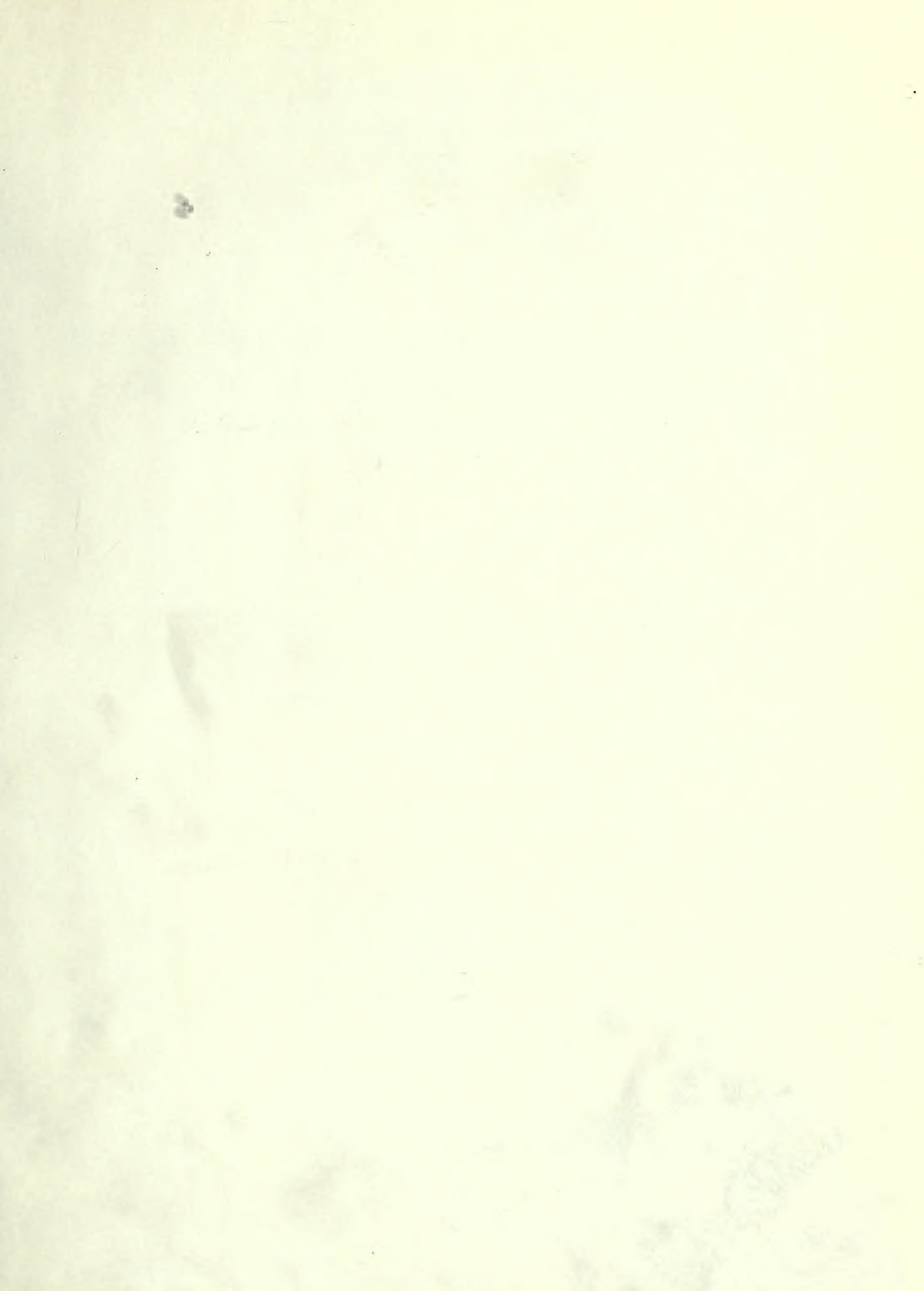


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U. S. COAST AND GEODETIC SURVEY

O. H. TITTMANN

SUPERINTENDENT

HYPSOMETRY

FOURTH GENERAL ADJUSTMENT OF THE PRECISE
LEVEL NET IN THE UNITED STATES AND THE
RESULTING STANDARD ELEVATIONS

BY

WILLIAM BOWIE

Inspector of Geodetic Work, and Chief of the Computing Division,
U. S. Coast and Geodetic Survey

and

H. G. AVERS

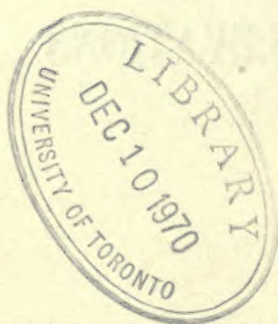
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FOURTH GENERAL ADJUSTMENT OF THE PRECISE LEVEL NET IN THE UNITED STATES AND THE RESULTING STANDARD ELEVATIONS.

By WILLIAM BOWIE, Inspector of Geodetic Work and Chief of the Computing Division, United States Coast and Geodetic Survey, and H. G. AVERS, Computer, United States Coast and Geodetic Survey.

GENERAL STATEMENT.

This publication gives the results of the fourth general adjustment of the precise level net in the United States. The other three adjustments were reported on in the publications, Appendix 8, Report of the Superintendent of the United States Coast and Geodetic Survey for 1899, entitled "Precise Leveling in the United States," Appendix 3, Report for 1903, entitled "Precise Leveling in the United States with a readjustment of the level net and resulting elevations," and "Precise Leveling in the United States, 1903-1907." The purpose of each of those three reports was to bring the publication of the results of precise leveling in the United States up to the date of issue. The first one (Appendix 8, 1899) set forth the methods employed in making the general adjustment of the precise level net then existing, and gave what was considered to be the most important items of information and opinions in regard to precise leveling which had been acquired during the course of a long and careful investigation of the problem of making the net adjustment and of securing the highest degree of accuracy in future precise level observations consistent with a reasonable degree of economy and rapidity.

The other two publications furnished such additions and corrections as would bring the information in regard to precise leveling in the United States up to the years in which they were printed.

The purpose of the present publication is to set forth the results of the latest adjustment of the level net which includes all of the precise leveling done previous to the year 1912, except those lines which do not form portions of closed loops, and to present the information regarding precise leveling which has been accumulated since 1907.

This publication differs from the other three reports on level net adjustments in several particulars, the principal of which are: (1) The orthometric correction is applied to the standard elevations to the westward of the Mississippi River, as it has been found necessary to apply this correction to the leveling in high altitudes. The Superintendent decided in 1910 in favor of the orthometric rather than the dynamic correction for *standard* elevations. (2) The elevations are given in feet as well as in meters. This change in the previous practice was made for the reason that practically all the surveyors and engineers in the United States express elevations in feet rather than in meters. (3) The accuracy of the recent leveling of the United States Coast and Geodetic Survey has been computed by formulæ adopted by the Seventeenth General Conference of the International Geodetic Association held at Hamburg in 1912 (see pp. 88 to 90).

Engineers and others intent only upon securing the necessary information to enable them to extend leveling, or upon using the elevations contained in this volume as data for various surveys and engineering projects, will find what they desire on pages 90 to 162, commencing with the *standard* elevations of bench marks. The descriptions and locations of bench marks are given on pages 162 to 294. At the back of the volume, page 295, is an index of bench marks arranged by states which should be consulted. The elevation of each bench mark in the net is given in this volume, but it was found impracticable to include all of the descriptions. All descriptions not found in this volume are contained in the reports of the three previous level net adjustments, viz, Appendix 8, Report 1899; Appendix 3, Report 1903; and "Precise Leveling in

the United States, 1903-1907." The index referred to indicates in which report the descriptions may be found. Any one or all of those reports or copies of certain of their pages will be furnished upon request to the Superintendent. A sketch of the whole net is shown in illustration No. 5.

A number of the members of the Computing Division and several field officers who have been temporarily assigned to that division, assisted in the computation and adjustment of the levels and in the preparation of the results for the printer. The authors desire to express their appreciation of the service rendered by them, and especially that rendered by Mr. W. D. Lambert.

NEW LINES OF LEVELING.

In 1906, 1907, and 1908 a line was run from San Diego, Cal., to Ogden, Utah. Its length is 1558 kilometers (968 miles), of which 731 kilometers (454 miles) were run after 1907.

In 1906, 1907, and 1908 a line was run from Pocatello, Idaho, to Crawford, Nebr., via Butte and Huntley, Mont. The length of this line is 1504 kilometers (935 miles), of which 668 kilometers (415 miles) were run after 1907.

In 1909 and 1911 a line was run from Goffs, Cal., to El Reno, Okla., via Albuquerque, N. Mex. Its length is 1976 kilometers (1228 miles).

In 1910 and 1911 a line was run from Fort Worth, Tex., to El Paso, Tex. Its length is 995 kilometers (618 miles).

In 1911 and 1912 a line was run between Brigham, Utah, and San Francisco, Cal. This line was not completed until late in 1912 and too late for its incorporation in the 1912 level net adjustment. Its length is 1434 kilometers (891 miles). The results of this line are not included in this report. It is expected that they will appear in another publication in the near future.

When the office computation was made of the levels run by the United States Coast and Geodetic Survey from Pocatello, Idaho, to Crawford, Nebr., via Butte and Huntley, Mont., the loop of which this line is a part failed to close by about 2 meters. All efforts in the office failed to locate the error exactly, and in the spring of 1910 a party was sent to Pocatello to begin a single line of check levels. This party was at work about six months and ran levels over 1560 miles of the circuit. At each of two places an error of 1 even meter was found. One of these errors was in the new leveling between Pocatello, Idaho, and Butte, Mont., and the other was in the line between Cheyenne, Wyo., and Ogden, Utah, which was a part of the net adjusted in 1907.* The loop closure was satisfactory after these errors were eliminated.

Besides the above new lines added to the precise level net by the United States Coast and Geodetic Survey, the following lines, forming portions of closed loops, have been added by the United States Geological Survey:

Albuquerque, N. Mex., to El Paso, Tex.—Length 409 kilometers (254 miles). The field work was done in 1905.

Mitchell, Ind., to Oakland, Ill.—Length 214 kilometers (133 miles). The field work was done in 1906 and 1907.

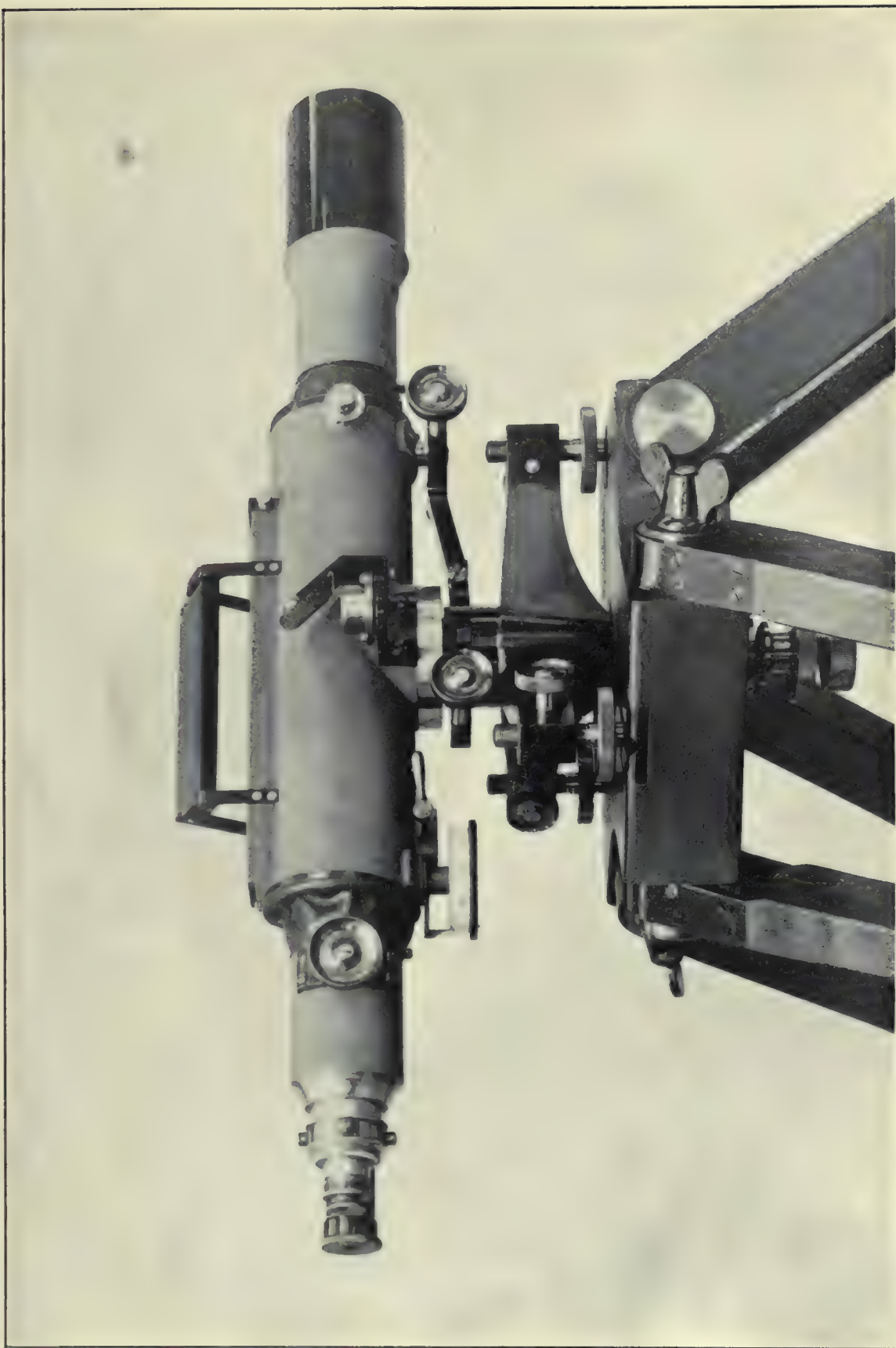
Mitchell, Ind., to Louisville, Ky.—Length 102 kilometers (63 miles). The field work was done in 1911.

Duquoin, Ill., to Shawneetown, Ill.—Length 114 kilometers (71 miles). The field work was done in 1906.

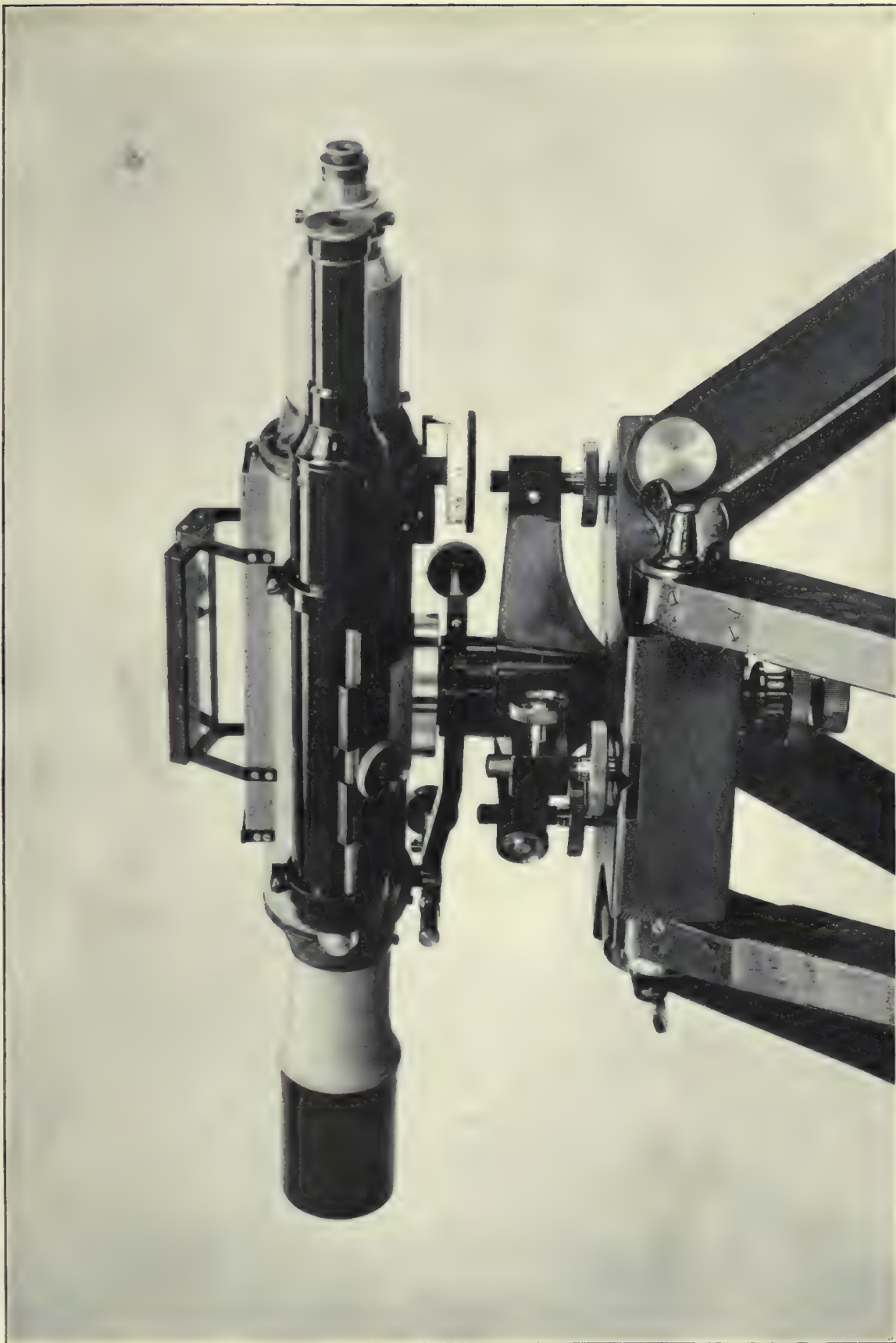
Georgetown, Ky., to Louisville, Ky.—Length 127 kilometers (79 miles). The field work was done in 1906.

The two following lines of precise leveling by the United States Geological Survey are not included in the 1912 adjustment, as they form only spurs, and their results have been published

* The level net of 1907 was composed almost entirely of leveling on the ninety-eighth meridian and eastward. To the westward of that meridian there was one loop, which closed at Cheyenne, and one line of levels, from Cheyenne to Seattle. The observed elevations, as carried from the Gulf and Atlantic to Seattle, agreed within 3 centimeters with mean sea level at that place, as determined by long series of tidal observations. This close agreement was later found to be due to the fact that the 1 meter mistake (and the accumulated accidental and systematic errors) was balanced by the orthometric corrections which had not been applied. After making the correction of 1 meter and applying the orthometric corrections to the various lines, the closing errors are those shown on illustration No. 5 of this publication.



U. S. COAST AND GEODETIC SURVEY PRECISE LEVEL, 1900 TYPE. RIGHT SIDE.



U. S. COAST AND GEODETIC SURVEY PRECISE LEVEL, 1900 TYPE. LEFT SIDE.

in bulletins of that Survey: One line was run in the years 1905 to 1907 from Rincon, N. Mex., to Yuma, Ariz., via Deming, N. Mex., and is 851 kilometers (529 miles) in length; and the other line, 377 kilometers (234 miles) in length, was run in 1906 and 1907 from Crookston, Minn., to International Falls on the Rainy River.

All of the above lines by the United States Geological Survey were run with instruments of the same type as the United States Coast and Geodetic Survey level shown in illustrations Nos. 1 and 2.

The following two lines by the United States Army Engineers have been included, as new lines, in the latest adjustment of the level net:

Lawrenceburg, Ind., to Cairo, Ill., along the Ohio River.—Length 743 kilometers (462 miles). The field work was done in 1903, 1905, and 1906.

Terre Haute, Ind., to Shawneetown, Ill., along the Wabash River.—Length 361 kilometers (224 miles). The field work was done in 1911.

The 1912 adjustment includes 8103 kilometers (5035 miles) of precise leveling more than the adjustment in 1907—6033 kilometers (3749 miles) by the Coast and Geodetic Survey, 966 kilometers (600 miles) by the United States Geological Survey, and 1104 kilometers (686 miles) by the United States Army Engineers.

There were 302 miles run by the United States Coast and Geodetic Survey and 763 miles by the United States Geological Survey between 1907 and the beginning of 1912 which have not been incorporated in the adjusted net, as they did not form parts of closed circuits. The results of those lines are not included in this publication.

INSTRUMENTS USED.

With the exception of a very few miles, all the precise leveling by the United States Coast and Geodetic Survey and the United States Geological Survey added to the level net, since the last adjustment, has been done with the type of instrument designed in the office of the United States Coast and Geodetic Survey, and fully described in Appendix 3, Report for 1903. Very accurate and rapid work has been done with this level in the United States. It has also been adopted for precise leveling by a number of other countries, and it is believed that it will be used to a great extent by surveyors and engineers in general when it becomes better and more widely known. Two views of this instrument are shown in illustrations Nos. 1 and 2. The rods used are of the direct reading type and carry a centimeter graduation on which readings are made to millimeters by estimation. The rods, made of white pine, have been impregnated with paraffin to such an extent that their lengths are apparently not affected by moisture. This type of rod is described in Appendix 8, Report for 1899, pages 418–419 and three views of it are shown in illustration No. 3.

The rods used by the United States Coast and Geodetic Survey were standardized at the office of that bureau just before and just after each field season, and on a number of days during the season the rods were compared in the field with a piece of steel tape on which two marks were made about 3 meters apart. That portion of the rod between the silver plugs at 0.1 and 3.1 meters was used in the comparison.

The index errors of the rods, which are the differences between 1 decimeter and the distance from the foot of the rod to the cross on the silver plug at approximately 0.1 meter, were made the same for each pair of rods, within a very small amount.

ADJUSTMENTS OF INSTRUMENTS.

The adjustment of the instrument is similar to that of the engineers' dumpy level, and the several operations need not be described here. The leveler should have with him a copy of Appendix 3, Report for 1903, in which the precise level used by the United States Coast and Geodetic Survey is described in detail. The adjustments made in the field are: (a) Adjust the universal level so that the bubble will remain in the center when the instrument is revolved in azimuth. (b) Make the axis of the bubble parallel to the line of sight by raising or lowering one end of the level vial. (c) Determine the *reversing point* of the micrometer head.

When the micrometer head is placed in such a position that the index coincides with the reversing point the bubble will remain in the center when the telescope is rotated 180° in azimuth. (d) Determine the stadia interval of the instrument. This is done by laying off various distances from the instrument and holding the rod at each and reading the three wires. From the distances and rod readings the stadia interval can be obtained easily. This interval may be furnished by the office, but it should be checked in the field. (e) The bubble of the universal level of the rod should be adjusted to the center when the rod is in a vertical position. (f) The rod should be tested for curvature. This may be done by directly sighting down its edges, or by placing the vertical wire of the instrument on the edges and noting whether they coincide throughout. (g) The vertical wire of the instrument should be tested to see if it is truly vertical, and the horizontal wires should also be tested for horizontality. With the present type of instrument it is extremely seldom that a readjustment of these wires must be made in the field.

INSTRUCTIONS FOR PRECISE LEVELING.

The general instructions issued to the precise leveling parties in 1908 and 1909 were those shown on pages 11-13 of "Precise Leveling in the United States, 1903-1907." After the discovery that mistakes of whole meters had been made on the loop Pocatello-Butte-Crawford-Pocatello, it was realized that certain additional safeguards should be employed in future leveling. After careful consideration of the subject the general instructions given below were issued by the superintendent in March, 1910. They were followed by the leveling parties during the seasons of 1910, 1911, and 1912. It will be noticed that many paragraphs are identical with those of the general instructions given in "Precise Leveling in the United States, 1903-1907."

In order that the reader may comprehend fully the spirit of the general instructions shown below, it may be well to call special attention here to three main points in regard to the instrument used:

First. The instrument is irreversible and as simple as possible. The telescope is supported directly on trunnions between the objective and the middle of the telescope and on the point of a micrometer screw near the eye end. It is therefore not capable of being rotated about its axis of figure. The level vial is fixed relatively to the telescope, except that the small range necessary for adjustment is provided. This makes it necessary to test the adjustment by a modification of the well-known peg method, as indicated later in the instructions. The simple instrument is used, as will be seen later, with an extremely simple program of observation.

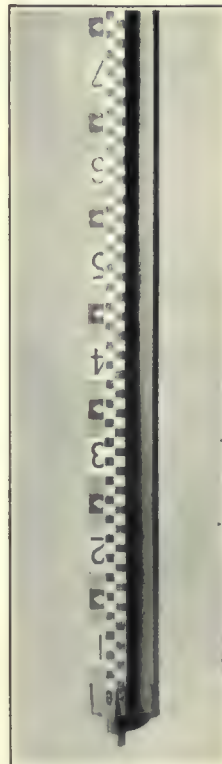
Second. A device for reading the bubble has been supplied which enables the observer to stand erect at all times and see the bubble and the rod alternately in quick succession without moving the eye and without even refocusing the eyes, the only change required being a mere shifting of the attention from one eye to the other.

Third. Great care has been taken in all the features in the design of the instrument to prevent errors in observation due to changes in the relative temperature of different parts of the instrument.

GENERAL INSTRUCTIONS FOR PRECISE LEVELING, MARCH, 1910.

1. Except when specific instructions are given to proceed otherwise, all lines are to be leveled independently in both the forward and backward directions.

2. The distance between successive permanent bench marks shall nowhere exceed 15 kilometers. There shall be no portion of the line 100 kilometers long in which there are not at least 20 permanent bench marks. No permanent bench mark is to be counted in considering these limits unless it is adequately described, nor shall both of two bench marks be counted if they are placed so near to one another and in such similar conditions of exposure as to be likely to be destroyed at the same time. The preceding statements refer to all permanent bench marks with which the leveling is directly connected, regardless of whether they are new bench marks or old ones established by other organizations. The above-stated limits are to be regarded as extreme lower limits. It is desired that the number of bench marks shall, in general, greatly exceed that just necessary to keep within the limits. A good example to emulate is a line run in New York State, in 1902, on which the average distance between bench marks was 2.5 kilometers. It is desired, also, that the bench marks in each general locality shall belong, in part, to each of several classes, such as bolts or other marks on buildings, squares cut or bolts or discs set in railroad masonry, such as bridge piers, water tanks, etc., stone posts, and iron-pipe bench marks.



U. S. COAST AND GEODETIC SURVEY LEVEL ROD.

3. The line of levels is to be broken by temporary bench marks into sections from 1 to 2 kilometers long, except where special conditions make shorter sections advisable.

4. Temporary bench marks should be established in places where they will be free from disturbance by the track hands working along the road or by materials unloaded from cars. This is especially important when the temporary bench mark is expected to hold the line for any considerable time. It is believed, however, that an undetected error caused by disturbance of the bench mark will be exceedingly rare, when two points, one set-up of the instrument apart, are used for holding the line.

5. At each city along the line, the leveling should be connected with at least two stable bench marks which are connected with the city datum. Connection should also be made with all stable bench marks of other organizations which may be found along the route.

6. In general, the top of rail of the railroad track should be used as the rod support. However, footpins should be carried along during the progress of the work and they should be used whenever a train is known to be approaching or when there are special reasons for supposing the rail not to be in a sufficiently stable condition.

7. When elevations and descriptions of bench marks established by a railroad (over which a line is to be run) are furnished to this office with a request by the officials of the road to have the precise leveling done by this Survey connected with them, as many of the railroad bench marks will be incorporated in our line of levels as can be done without greatly delaying its progress. The railroad bench marks which are of a permanent nature are to be treated in the same manner as new permanent bench marks established by the precise leveling party. If the permanent bench marks of the railroad are chiefly of the same general type they must not be given full weight in deciding whether there are enough bench marks in any section of the line. (See paragraph 2.) Bench marks of the railroad which are not of permanent character may be determined by extra foresights, as in the manner provided for determining the height of rail in front of a railroad station (see paragraph 10). It will not be necessary to connect the precise leveling with the railroad bench marks which are in places not easily accessible. It will not be necessary to connect with each railroad bench mark where they are less than 1 kilometer apart. The benefits derived from connecting a line of precise leveling with railroad bench marks are: (a) That time is gained by having some permanent bench marks already established; (b) the elevations of the railroad bench marks resulting from the connection with precise leveling are of great value to the railroad concerned; and, (c) as the work progresses, a check is obtained on gross mistakes which might escape notice, by comparing the elevations furnished by the railroad with those by the precise leveling party.

8. All old bench marks are to be called by their old names or numbers and are to be described fully by quoting the old description, if one is available, and by making additions or corrections to it.

9. All new bench marks are to be designated by capital letters with numerical subscripts after the alphabet has been exhausted in each State.

10. The elevation of the top of the railroad rail in front of each railroad station along the line of levels is to be determined with a check. This may be done by using the point on the rail as a rod support in either the regular forward or backward running of the line, or by taking an extra foresight to it on both the backward and forward runnings, or by taking extra foresights to it from two instrument stations near it in one of the runnings of the line.

11. When it is desirable to get the elevations by means of which to compare the line of levels with the profile of the railroad, such elevations may be gotten by single readings on the rod held on top of the rail opposite water tanks, and over bridges and culverts. Such structures are usually shown on the railroad profiles.

12. It is desirable that the backward measurement on each section should be made under different atmospheric conditions from those which occur on the forward measurement. It is especially desirable to make the backward measurement in the afternoon if the forward measurement was made in the forenoon, and vice versa. The observer is to secure as much difference of conditions between the forward and backward measurements as is possible without materially delaying the work for that purpose.

13. On all sections upon which the forward and backward measures differ by more than $4\text{mm}.0\sqrt{K}$ (in which K is the distance in kilometers leveled between adjacent bench marks) both the forward and backward measures are to be repeated until the difference between two such measures falls within the limit. No one of the questioned measures is to be used with a new measure in order to get this agreement.

14. If any measure over a section gives a result differing by more than 6 millimeters from the mean of all the measures over that section, this measure shall be rejected. No rejection shall be made on account of a residual smaller than 6 millimeters unless there is some other good reason for suspecting an error in this particular measure, and in such cases the reason for rejection must be fully stated in the record.

15. Whenever a mistake, such as a misreading of 1 decimeter or 1 meter, or an interchange of sights (the back-sight being recorded as a foresight), is discovered in any measure after its completion and the necessary correction applied, such measure may be retained provided there are at least two other measures over the same section which are not subject to any such uncertainty. Provided, further, that when it is found that the mistake was made on the last instrument station of the second running of a section and it is corrected on the same day and before beginning work on an adjacent section, such measure may be retained and no further measures of the section are to be required on account of the mistake.

16. The program of observation at each station is to be as follows:

Set up and level the instrument. Read the three lines of the diaphragm as seen projected against the front (or rear) rod, each reading being taken to the nearest millimeter (estimated), and the bubble being held continuously in the middle of the tube (i. e., both ends reading the same). As soon as possible thereafter read the three lines of the dia-

phragm as seen projected against the rear (or front) rod, estimating to millimeters as before, and holding the bubble continuously in the middle of the tube.

17. At each rod station the thermometer in the rod is to be read to the nearest degree centigrade and the temperature recorded.

18. At stations of odd numbers the backsight is to be taken before the foresight, and at even stations the foresight is to be taken before the backsight. As the same rod is held on a rod station for both the fore and backsights, the effect of this is that the same rod is read first at each set-up, it being the rod used for the backsight at the first instrument station.

19. The difference in length between a foresight and the corresponding backsight must not exceed 10 meters. The difference is to be made as small on each pair of sights as is feasible by the use of good judgment without any expenditure of time for this particular purpose.

20. The recorder shall keep a record of the rod intervals subtended by the extreme lines of the diaphragm on each backsight, together with their continuous sum between each two contiguous bench marks (temporary or permanent). A similar record shall be kept for the foresights. The two continuous sums shall be kept as nearly equal as is feasible without the expenditure of extra time for that purpose, by setting the instrument beyond (or short of) the middle point between the back and front rods. The two continuous sums for a section shall not be allowed to differ by more than a quantity corresponding to a distance of 20 meters.

21. Once during each day of observation the error of the level should be determined in the regular course of the leveling and recorded in a separate opening of the record book as follows: The ordinary observations at an instrument station being completed, transcribe the last foresight reading as part of the error determination, call up the back rod and have it placed about 10 meters back from the instrument, read the rod, move the instrument to a position about 10 meters behind the front rod, read the front rod and then the back rod. (The two instrument stations are between the two rod points.) The rod readings must be taken with the bubble in the middle of its tube. The required constant C to be determined, namely, the ratio of the required correction to any rod reading to the corresponding subtended interval, is

$$C = \frac{(\text{sum of near rod readings}) - (\text{sum of distant rod readings})}{(\text{sum of distant rod intervals}) - (\text{sum of near rod intervals})}$$

The total correction for curvature and refraction must be applied to the sum of the distant rod readings before using it in this formula. The level should not be adjusted if C is less than 0.005. If C is between 0.005 and 0.010 the observer is advised not to adjust the level, but if C exceeds 0.010 the adjustment must be made. If a new adjustment of the level is made, C should at once be redetermined. It is desirable to have the determination of level error made under the usual conditions as to length of sight, character of ground, elevation of line of sight above ground, etc. The adjustment of the instrument to reduce C must be made by moving the level vial, not by moving the reticle.

22. Notes for future use in studying leveling errors shall be inserted in the record, indicating the time of beginning and ending the work of each section, the weather conditions, especially as to cloudiness and wind, and whether each section of the line is run toward or away from the sun. Such other notes should be made as promise to be of value in studying errors.

23. The instrument shall be shaded from the direct rays of the sun, both during the observations and when moving from station to station.

24. The maximum length of sight shall be 150 meters, and the maximum is to be attained only under the most favorable conditions.

25. At the beginning and end of the season, and at least twice each month during the progress of the leveling, the 3-meter interval between metallic plugs on the face of each level rod shall be measured carefully with a steel tape which shall be kept continuously with the party during the season for that purpose only. The temperatures shown by the thermometer inserted in the rod and by the thermometer attached to the tape at the time of each of these measures must be recorded. The purpose of these measures is to detect changes in the length of the rods and not to determine the absolute lengths. The absolute lengths are determined at the office between field seasons.

26. The tape furnished by the office for measurement of the rods is a piece of steel tape about 3.1 meters long, having near one end a fine line graduation and about 3 meters from it (at the other end of the tape) a series of fine millimeter graduations on a steel rule riveted to the tape. With this special form of tape the measurement of a rod should be made somewhat as follows: The rod should be supported at about the 0.85 meter and 2.45 meter points only (approximately quarter points) to get the least bending of the rod for any two-support system. In making the measurement the single line should be made to coincide with the fine line on the silver plug nearest the bottom of the rod and the reading should be made at the line on the silver plug at the top of the rod. It is possible to estimate the half tenths of millimeters on the rule which is attached to the tape. The tape should be placed on the face of the rod in such a way that the edge of the tape from which the steel rule does not project, coincides with the edge of the face of the rod nearest the meter marks of the rod. Care must be taken that the two edges coincide closely in order that the tape may always assume exactly the same position. The end of the tape at the foot of the rod should be clamped firmly to the rod after the line on the tape and that on the plug have been made to coincide. The tape should then be smoothed down by the hand to make it lie perfectly flat on the face of the rod. With the hand lifted and, consequently, no tension on the tape, the reading should be made from the rule attached to the tape near the upper or top end of the rod.

27. The field computations and abstracts are to be kept up as the work progresses. As soon as each book of the original record is out of use it is to be sent to the office by registered mail. The corresponding abstracts must be retained until an acknowledgement of the receipt of the original record at the office has been received.

28. No duplicates of the original records are to be made except of the descriptions of bench marks, of which duplicates in the form of carbon copies are to be made. At least once during each month such carbon copies as have accumulated are to be sent to the Inspector of Geodetic Work.

29. At least once each month, during the progress of the leveling, a test must be made of the adjustment of the rod levels, and a statement should be inserted in the record showing the manner in which the test was made, whether the error was found to be outside the limit stated below, and whether an adjustment was made. With the bubble of the level rod held at the center, the deviation from the vertical of the plane intersecting the center of the face of the rod throughout its length and normal to the face of the rod, must be determined. The deviation from the vertical of the plane coinciding with the face of the rod, must also be determined. If the deviation from the vertical exceeds 10 millimeters on a 3-meter length of the rod, the rod level must be adjusted.

30. On the left hand page of the record the number of each instrument station at which the instrument is not set up in the railroad track is to be included in parentheses. Similarly, on the right hand page of the record, the designating letter for the foresight rod (V, W, etc.) shall be inclosed in parentheses, if said rod is not supported on the railroad rail. If the length of any portion of the level line run off the railroad is 25 meters or more greater than the railroad distance between the points of departure from and return to the railroad, then the distance along the track between these two points must be shown in the record. The purpose of these requirements is to furnish the office a means of detecting blunders in the leveling, by plotting the level line on the profile of the railroad.

31. When it is expected that the forward and backward runnings of the line are to be completed up to any one place, the elevation at that place should be held by two points, established at least one set-up of the instrument apart. When the leveling is continued from or to such a pair of points, the instrument should be set up between them and readings of the rod taken on each point. The same arrangement of points should be used at the completed end or ends of any detached portion of the line of levels. Either one of the two points may be used for carrying along the elevation, with the other used only as a check against mistakes in reading the rod, or a disturbance of one or both of them. The records should show clearly which one of the two points was used to carry the elevation and it is believed that it is good policy to use the same point (backward or forward) in each case as far as may be practicable. It is believed that, by employing this method, no mistake of a meter or a decimeter made in reading the rod, held on a bench mark, will escape detection.

32. As far as possible, all the permanent bench marks should be in the main line of levels and not on spur or branch lines. One of the exceptions to this rule is where the line runs several miles off the railroad to the mark of a triangulation station. In such a case the spur, or branch line, is the more economical way of doing the work and will be satisfactory. Whenever a permanent bench mark is established by means of a spur or branch line, which has only one set-up, the forward and backward lines of the spur or branch should be run at different times of a day or on different days, if practicable. If it should be necessary to have the two runnings made one immediately after the other, the height of the instrument should be materially changed to make the second measure. This would help to prevent any mistake in the leveling.

33. Except in rare cases, the permanent bench marks should be established before or during the first running of the line. It is believed to be inadvisable to delay the tying in of the permanent bench marks until after the line has been run, even in only one direction. When it is impracticable to establish a permanent bench mark before or during the first measurement of the line, an acceptable manner of tying in the permanent bench mark or including it in the main line of levels is to establish a temporary bench mark on both sides of the proposed location of the permanent bench mark and to leave the distance between them unlevelled until the permanent bench mark has been set. The arrangement of the temporary bench marks established for this purpose should be similar to that described in the latter part of paragraph 31 of these instructions. This would provide for two points, the difference in elevation between which are known, on each side of the permanent bench mark and the distance between the two pairs of points makes a section in the main line of levels. A diagram showing the arrangement of the stakes and the permanent bench mark is shown below:



The positions of the instrument are shown by X, the positions of the temporary bench marks by O, and the position of the permanent bench mark by □.

34. Chiefs of party should keep the length of sight great enough to make it necessary to do a moderate amount of rerunning. If an observer is extremely cautious and confines all his observations to sights sufficiently short to insure easy reading of the rod, it is possible to work month after month with almost no rerunning, but the progress will be slow. On the other hand, it is certain that an attempt to take sights of the limiting length, 150 meters, at all times would lead to a very large amount of rerunning and the progress would not be rapid. It is believed that the maximum speed consistent with the required degree of accuracy will be secured by continually keeping the length of sight such that the amount of rerunning will be from 5 to 15 per cent. An extremely small percentage of rerunning would indicate an excess of caution on the part of the observer. The occurrence of a moderate amount of rerunning is due largely to an attempt on the part of the observer to obtain the maximum progress consistent with the required degree of accuracy and not to inability to secure such observations that little or no rerunning would be necessary. Observers have found a convenient rule in fixing the length of sight to be to shorten the sights whenever the upper and lower thread intervals subtended on the rod are found to differ frequently by more than a selected limit. Each observer should fix the limit from his own experience by noting the relation between such a provisional limit and the amount of rerunning found to be necessary while using it. Such a rule is based upon the idea that the additional

errors which are encountered when the length of sight is increased are, in the main, those due to the increasing accidental errors in reading the rods.

35. It is not thought advisable to state definitely in these instructions the allowable limit on the rate of divergence between the forward and backward lines, but this should be kept small.

36. The record and the preliminary or field computation of precise levels must conform to the examples given on pages 22 to 26 of this publication, except that in the computation shown on page 25 the five corrections for curvature and refraction, level, index, length of rod, and temperature are not to be applied in the field.

37. Should the experience of a chief of party indicate to him that a change or changes in these instructions would facilitate the work in the field, he is urged to communicate with this office regarding such changes.

38. When cases arise which are not provided for by these general instructions or by specific instructions, the chief of party will use his own judgment in the matter.

COMMENTS UPON THE GENERAL INSTRUCTIONS.

These instructions do not change the essential features of carrying on the field work of precise leveling done under the general instructions as published in *Precise Leveling in the United States, 1903-1907*. They do, however, provide for greater safeguards against mistakes in reading the rod, which might remain undiscovered until the closure of the circuit of which the line is a part.

The instructions, in general, have been written in sufficient detail for their proper understanding by the party carrying on the field work, but there are given below some comments which may be of value both in the field and office.

Referring to paragraph 6 of the General Instructions: All the precise leveling by the United States Coast and Geodetic Survey has been along railroads and through the towns and cities on them, except short spur lines out to triangulation stations. Since 1903 the rail has been used as the rod support except when a train was known to be approaching, when a pin was used. Since adopting the rail for the rod support, the accumulation of the discrepancy between the two runnings of a line, backward minus forward ($B - F$), has been within reasonable limits, and the speed and accuracy have been greater than when pins or plates were used exclusively.

Two uncertainties in connection with this method of rod support will occur to anyone who considers it carefully, namely, the uncertainty as to whether the rodman holds the foot of the rod for both foresight and backsight on precisely the same point on the slightly rounding and sometimes inclined surface of the top of the rail, and the uncertainty as to the recovery by the rail of its former elevation after a train has passed over it.

The first of these uncertainties is very small, provided the rodman is careful. No difficulty has been found in marking with chalk or keel the exact spot on the rail in such a way that the mark is recoverable, even after a train has passed over it. Besides, the lines nearly always follow main lines of the railroad where, in general, the roadbed is well constructed and the rails are held firmly to the ties. The rails are usually heavy, with large heads having broad top surfaces, so that even if a rodman fails to place his rod for the backsight exactly on the spot used for the foresight the error introduced would be small. If the rail is light in weight, badly worn, and sloping on the top of the rail head, then the rodman must be especially careful to have his rod in exactly the same position for the two sights.

When the roadbed is in good condition, the rodman standing on the ties does not seem to disturb the rail on which the rod is supported.

With regard to the second objection to the use of the rail as a rod support, that it will not recover its original position after the passage of a train, it should be remembered that it is only occasional (not so much as once each day, if the observer is at all careful) that a train goes over the rod support between the fore and back sights. Besides, each of several observers has reported that tests were made which show that rod readings, with the rod held on the rail, were the same after the passage of a train as before, within the limits of reading the rods. In making these tests the leveling instrument was set up some meters from the track.

With the binocular type of instrument, accurate leveling can be carried over trestles or bridges. Rod points should be established on or over the piers.

Paragraph 7 is an addition to the previous instructions, and it is in sufficient detail to make its meaning entirely clear.

The height of the rail in front of the railroad station at a town is usually given by the railroad and in dictionaries of altitudes as the elevation of the town. As there should be no gross

error in such elevations, a paragraph (No. 10) was added to the previous general instructions which requires that these elevations should be determined with a check.

Paragraph 12 provides that the forward and backward runnings of a section should be made under different atmospheric conditions, if possible without materially delaying the progress of the work. In future leveling the chiefs of party will be directed to make the two runnings on different days if possible, this being one of the requirements for *leveling of high precision*, adopted by the Seventeenth General Conference of the International Geodetic Association in 1912. If the two runnings of a section are made on different days, and one is made in the forenoon and the other in the afternoon, it is believed that any systematic errors due to atmospheric causes will be largely eliminated.

A large portion of the rerunning, made necessary by a failure of the forward and backward measures to agree within the prescribed limit, has occurred on rather steep grades and especially when the observer made his sights as long as the slope would permit. This would bring the line of sight close to the ground on one side and high in the air on the other. The greatest difficulty was encountered on clear days when the ground and air had temperatures differing by varying amounts, depending on the time of day. Under this condition it is natural to expect that the effect of refraction on the upper sight will be different from that on the lower one. Where the two runnings of a section were made on a cloudy day very little trouble was found in making the two lines agree within the required amount. During the season of 1912 the line of precise leveling along the railroad from San Francisco eastward ran through one snowshed which was about 37 miles (60 kilometers) in length. The grade of this portion of the road was between 2.0 and 2.5 per cent. The chief of party reported that only three sections, of a total of 60 sections through this shed, failed to close within the requirements and that, in his opinion, these failures were due to insufficient light in the tunnels. On the clear line for a distance of 51 kilometers before reaching the snowsheds great difficulty was experienced in making the two runnings check and ten of the total of 49 sections were remeasured, the rerunning amounting to about 20 per cent. After having passed through the shed the rerunning, on a portion of the line with steep grades and 51 kilometers in length, again became high with 10 per cent, or 4 sections of the total of 42.

If a line on a steep grade is leveled in opposite directions under the same or approximately the same atmospheric conditions, no great difficulty should be found in making the two runnings agree. But on clear days there would be, no doubt, systematic errors of considerable size.

In future precise leveling by the United States Coast and Geodetic Survey the observer will be directed to be careful that, on clear days, the line of sight from the lower wire does not come closer to the ground than about 3 decimeters. This may require shortening of the sights on steep grades and the progress will be slower than if there were no minimum limit to rod readings, but it will keep the line of sight above the badly disturbed layers of air close to the ground. On cloudy days this precaution probably will not be necessary.

The second sentence of paragraph 15 permits the observer to retain without rerunning a measure on which a mistake has been made, if the mistake is corrected immediately. It is considered unsatisfactory to do so some days, or even hours, later for it may be impossible to replace the instrument to make the test of the rod readings at any particular set-up.

By carrying out the program of paragraph 18 any systematic effect due to falling or rising temperatures, or to changing atmospheric conditions, is practically eliminated.

It has been found that the tape described in paragraph 26 has given excellent results when used as a straightedge in measuring the rods in the field. The measurements previously made with a pocket steel tape with or without a constant tension were not entirely satisfactory.

The progress of a leveling party is partially dependent on the amount of office work which must be done in the field. No duplicates are made of the record of observations or of the computations. The abstract, properly prepared and checked, is assumed to be a sufficient guard against the loss of a line of levels. Only such computations are made in the field as may be necessary to indicate the accuracy of the work done. A duplicate is required of the descriptions of stations, a carbon copy being satisfactory. (Consult paragraphs 27, 28, and 36.)

Paragraphs 31 to 33 describe methods of establishing bench marks and connecting with them which should greatly lessen the danger of having a serious mistake, such as one meter or a decimeter, occur in the line and not be detected. Comments on paragraph 35 will be found in connection with errors of leveling on page 19.

ORGANIZATION AND EQUIPMENT OF PARTY.

It has been the practice in the United States Coast and Geodetic Survey during a number of years to have a prospective chief of party attached to the party of an experienced officer for a short time, usually about a month, in order that the former may become acquainted with the management of the party, manipulation of the instrument, and the proper way of making out records, computations, etc. By this method, the work done by different observers is remarkably uniform in character and accuracy. Occasionally the training is done by an older officer who assists the new one to equip and organize the party of the latter. It is believed to be the better plan to have the new chief of party serve a short time with the experienced officer.

The instructions require that the records be sent to the office as soon as they are abstracted. These records are inspected under the direction of the Inspector of Geodetic Work who calls the attention of the chief of party to any departure from what are considered the best methods of observing and computing. It is usually the case that the letters which go directly from the inspector to the observer, during the first month or two, touch upon most of the causes of trouble to the new leveler. The latter should follow the general instructions very carefully, both as to observing and computing.

It has been found advisable to furnish the new leveler with copies of reports made by older observers, which are of great assistance to him. Several excellent detailed reports on the field work have been submitted by chiefs of parties. There is given below certain information which may be of assistance to the new man. This is based largely on the special reports by Assistant J. H. Peters and former Aid Ford Kurtz.

Besides the chief, the party usually consists of five men. They should be young and active, and it is usual to employ men who live in the general locality of the work. There is not very much advantage in having men of previous experience, except in the case of the recorder. Men of the proper kind will soon learn their duties. The recorder should have at least a high-school education and, in fact, it is well that the other men should have had sufficient education to enable them to assist in checking the books and abstracts. The chief of party should replace any man as soon as he shows inaptitude for the work. The party must work as a team and its rate of progress is dependent on each man. As a rule, men should be selected who weigh from 130 to 150 pounds. Those weighing over 160 pounds should not be employed on account of the extra weight which they would add to the load of the velocipede cars.

One man does the recording, two act as rodmen, one is the sunshade man, and one is the wind-shield man.

The outfit of instruments consists of the following:

- 1 geodetic level and tripod.
- 2 geodetic level rods.
- 2 rod foot pins or plates.
- 1 special 3-meter tape for measuring rods.
- 2 thermometers.
- 1 15-meter tape.
- 1 watch for recording purposes.
- 2 fountain pens for recording purposes.

The height of the tripod should be such that the observer may stand without strain while reading the rods.

The other equipment will depend largely on the country to be traversed.

Along all railroads except those on which the traffic is very heavy the leveling party works with hand velocipede cars. During the latter part of the season of 1911 and all of the season of 1912 on the Southern Pacific Railway between Brigham, Utah, and San Francisco, Cal., the

party also used a motor velocipede car. In some parts of the country it is necessary to live in tents or freight cars fitted with mess and sleeping arrangements. Whether the party should live in hotels, camp, or cars is left almost entirely to the judgment of the chief of party, if there is a choice among several ways of living. A sunshade, a wind shield, a few tools for repairing the velocipede cars, metal bench marks (see illustration No. 3), a stationery case, besides any necessary tents, bedding, and mess equipment will complete the party outfit. Chiefs of party are advised to keep the amount of property as small as is consistent with the comfort of the members as the care, packing, and shipping of a large camp outfit greatly retards the progress of the leveling and adds much unnecessary labor.

MANAGEMENT OF PARTY AND PROCEDURE IN FIELD.

After receiving instructions to run a line of leveling, the chief of party should ascertain if permission has been secured from the railroad company over whose road the leveling is to be done for the operation of velocipede cars. If this has not been obtained or if permission has been refused by letter, he should interview the general manager of the railway in person, if practicable, and explain the purpose of the work and the manner of using the cars. It is probable that the permit will then be given. The company will prepare a form of agreement that is to be signed by the members of the party, releasing the company from any damages to such members in case of injury while using the cars.

The chief of party is directed by the office to use every precaution practicable to avoid accident to his party and obstruction to the traffic of the road over which the leveling is done. When the road has numerous curves and steep grades, he is advised to have an extra man in his party who will keep several hundred yards above the instrument and act as flagman. It is frequently difficult to hear an approaching train which is running down grade with little or no steam.

The chief of party should obtain from the chief engineer of the railway copies of elevations and descriptions of the railroad bench marks and also profiles, if possible.

He should arrange with some stonecutter to prepare and ship to designated points stone posts to be used as bench marks. The practice now is to have the cutter set a metal disk bench mark in the top of the post. The chief of party should secure from the railway agent a list of stations along the line of the leveling to which shipments may be made, and the firm furnishing the bench marks should be given a copy of the list with directions for distributing the stones. When the chief is not familiar with the country through which the line will run, he should go over it by train and take such notes as may be of value to him in planning the season's work.

In the special report by Mr. J. H. Peters, referred to above, he made the statements which follow. Mr. Peters used one 4-horsepower motor velocipede car and one hand velocipede car. Usually the hand car was left out beside the track near where the next day's work would begin, and the party went to and from their headquarters on the motor car. The hand car was pulled from one section of the road to another by the motor car when the leveling on any one day was not continuous:

* * * During the process of leveling, the motor car is used as the forward or instrument car while the hand car is used as a rear or rod car. One rod is designated as the head rod and the man carrying it is known as the head rodman. The other rod is designated as the rear rod and the man carrying it is known as the rear rodman. The rods retain their designations throughout the season, but the men may be changed from rear to head rodmen at will. The "head rod" and the "rear rod" should not be confused with the "front rod" and "back rod." One rod is always the "head rod" but it alternates from the "front" to the "back" rod or "back" to "front" rod with successive instrument stations.

On beginning work in the morning the procedure would be as follows: The instrument would be set up between the rails, at a distance from the bench mark at which the line starts depending on the observing conditions. The head rod is sent to the bench. The rear rodman goes ahead a distance equal to that between the bench mark and the instrument, where he makes a cross (with chalk, keel, or some other material) on which he holds the rod, on the right-hand rail. While this is being done, the observer levels the instrument which has been set up behind the head car and in front of the rear car. He then sights on the rod held at the bench mark and reads the three cross wires, calling out the three readings to the recorder thus, "one, nine, one, seven; two, one, two, nine; two, three, four, one." Then for a check he calls out the first two figures of the middle wire thus, "twenty-one." This is done in a voice

loud enough to be heard by the rodmen. The head rodman then takes his rod down, reads the rod thermometer, comes forward to the cars and gives the recorder the temperature of his rod. The rear rodman perfects the leveling of his rod, when it is read likewise. The recorder sees that there is no error in the readings and says "check." The observer picks up the instrument and gets on the rear seat of the head car. The umbrella man and wind-shield man (the latter acting as engineer) start the car, then the run is made to the next station.

Before passing the rear rodman, who remains at the position where the foresight was taken, the observer tells the engineer the number of rails which he desires to proceed beyond the rear rodman, thus: "Take ten." The engineer then stops the car just beyond the tenth rail joint where the observer gets off the car and sets up the instrument at station No. 2. The rear car on which are the recorder and rodman comes up behind the head car and stops just short of the tenth rail joint. The head rodman, who has also counted the rails, goes forward, calling out "ten" as he passes the instrument. If this happens to be the correct number of rails in the backsight the observer replies "check." The head rodman then goes forward 10 rails where he places a cross on the right-hand rail opposite the joint in the left-hand rail. This will be the second foresight and as the head rod is in foresight, it will be read first, after which the rear rod is read. The instrument car then moves forward to the next station and is followed by the rod car after the rear rodman has come forward to it.

When the head rod is in backsight, the head rodman will be able to reach the cars while the rear rod, which is in foresight, is being read. The recorder will then be able to catch hold of the motor car and be trailed to the next station. This may be done with advantage when the length of sight exceeds about eight rails. Thus the man who carries the head rod will have very little working of the hand car to do. For this reason the rodmen are directed to change rods each day at noon, to make the work equally hard for each rodman. It should be borne in mind that the same rod is to be read first at each station. This rod will be held part of the time by one rodman and part of the time by the other rodman. On cloudy days, when a 15-rail (150 meters) sight can be taken throughout the day, it will be found advantageous to use only the head car, waiting at each alternate station for the rear rodman to come forward. The sunshade man may then be put to setting bench marks and the rodman may occupy his seat on the head car, the recorder also taking a seat on that car.

In setting up the instrument the tripod should be placed with two legs in a line parallel to the track, and the other at right angles to this line. In standing at the instrument looking at the head rod the two legs should be next to the right-hand rail. Setting up in this way places the telescope in position for lifting the instrument to the shoulder after reading the rear rod. Other instruments, however, may require that they be set up exactly opposite to this method.

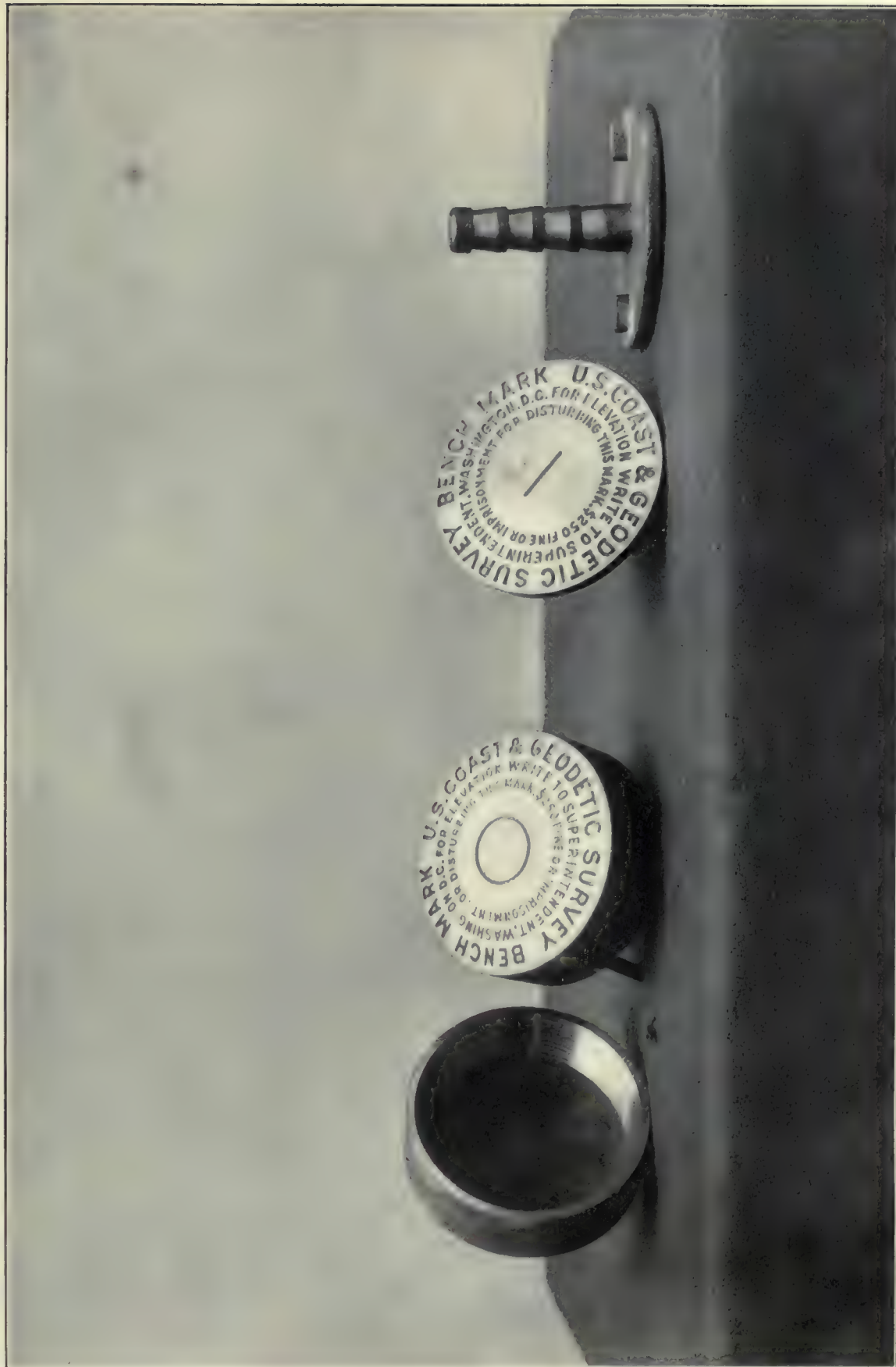
The leveling of the instrument is made approximately with the small universal level attached to the side of the telescope, after which it is perfected with the level proper. The point on the head of the micrometer screw (the reversing point) which indicates the position in which the screw must be in order that the line of sight may be revolved in a horizontal plane when the instrument is leveled, has been determined and marked on the head with a soft pencil. In leveling at a station the head of the micrometer screw is placed in that position and the telescope is turned at right angles to the direction of progress with the eyepiece over the leg of the tripod that is at right angles to the railway track. The bubble of the universal level is then brought to the center, after which the adjustment in a plane perpendicular to the track is perfected with the leveling screw nearest the eye end of the telescope, by bringing the bubble of the level proper near the middle of the tube. The telescope is then turned parallel to the track, directed toward the head rod, and the adjustment perfected in that direction, using the two leveling screws that are in a line parallel to the track. The telescope is now nearly in position to read the head rod, and as stated above will be in a position for lifting the instrument when the rear rod has been read. If this method of setting up the instrument be followed, the number of separate motions will be a minimum, and thereby the least time will be required at each station. The beginner need only remember that the tripod should be set with two legs in a line parallel to the track and next to the right-hand rail when looking toward the head rod. By following this practice there is less liability of reading the rear rod first, since to do so will seem awkward to the observer.

The method of accommodating the party will depend greatly on the nature of the country through which the work is done. If rooms and board can be secured along the line, tents and cooking outfit will not be needed, thereby greatly reducing the cost of moving the outfit and giving more agreeable accommodations for the party. Such accommodations can not always be secured, however, in which case two tents, each 10 feet wide and 12 feet long, will be sufficient for sleeping quarters. An old tent should be carried in which to do the cooking. Each man should be provided with a cot and bedding. The chief should bear in mind that the movement of his party will be greatly facilitated if nothing is carried that can possibly be dispensed with.

The hand velocipede car is locked and left overnight at the end of the day's leveling. The motor car on which the party returns from work may be placed in the tool house of the railroad section crew or in some storehouse near the track and should be locked for the night.

Repair parts for the motor and hand cars are secured from the company making them. They should be ordered by number, as given in the catalogue furnished by the company. The following extra repair parts and tools for replacing them should be carried in the tool box of the motor car:

- 1 spark plug.
- 1 exhaust valve.
- 1 intake valve.
- 1 driving chain.
- 1 axle for drive wheel.



U. S. COAST AND GEODETIC SURVEY BENCH MARKS.

The field procedure will be nearly the same as the above should there be two hand cars instead of one hand and one motor car.

Each chief of party will use his own judgment as to the best method of moving his party and equipment from one town to another. It is frequently the case that the party can make the move on the cars used, especially if one be a motor car, and do some leveling en route. The equipment not used in the actual leveling can be shipped forward by express or freight. It is well to have one member of the party detailed to make the shipment, accompany it to the next headquarters of the party, and arrange for a storeroom, hotel accommodations, etc.

Whenever possible the permanent bench marks should be set before the leveling, and the chief of party can usually arrange his work so as to send one or more men out to do this.

Each man in the party should be given a certain part of the work to do (aside from rodding and recording or similar work) and he should be held responsible for its proper execution. Such work consists of care of instruments and other property, getting equipment ready for work in the morning, storing it at night, keeping cars in repair, etc.

The chief of party should caution each man to be extremely careful with the leveling rods. No undue strain should be placed on them and they should be kept straight. (The rods are so constructed that they may be bent and given a permanent set; but they are easily straightened without injury or change of length.)

When holding a rod for observations the rodman should not bring any weight to bear on it; otherwise he might disturb the support when it is a pin or plate.

The rodman should be directed not to place the foot of the rod on the ground. He should not lean the graduated face of the rod against his clothing nor have it come in contact with his arms or hands. This is necessary if the graduations are to be kept bright and clean. The rod should be handled so carefully that the face will not be broken or chipped or the level bubble disturbed.

BENCH MARKS.

The various types of bench marks used by this and other organizations are described in detail in the notes on pages 162 to 166 of this publication. The pipe bench marks (note 2, page 162) were used very little on the line of levels between San Francisco, Cal., and Brigham, Utah, stone posts having been used in their place. The difference in cost is not great, and the pipe marks, when set without concrete, can not be expected to remain stable and free from rust for any great length of time. In the center of the top of each stone post on the San Francisco-Brigham line was set one of the inscribed disk bench marks shown in illustration No. 4.

It has been found that the inscribed bench marks are very much less disturbed from curiosity or vandalism than those which consist of only bolts or marks cut into rock. Besides, the location of a mark of the inscribed type is known by most of the people living in its vicinity and is easily recovered.

Stone posts placed in the grounds of public buildings and disks set into the buildings themselves make excellent bench marks.

Care should be taken in selecting the places, buildings, or grounds on which to place permanent bench marks. It is important that the mark be placed where the bench mark itself will not be removed as a result of building or other engineering operations, and it is even more important that the character of the structure or ground in which the mark is placed is such that it will not settle and change the elevation of the mark. Made ground and marshy ground are dangerous, as are also new buildings and other masonry structures whose foundations are not on bedrock.

A temporary bench mark, found to be very satisfactory, is a stake 2 inches by 3 inches in cross section and about 12 inches long. The length will depend upon the nature of the ground. Into the stake should be driven a nail (8-penny has been found to be a satisfactory size) with its head about one-fourth of an inch above the stake. If the nail is not driven down all the way, swelling of the battered top of the stake will not disturb its elevation. The rod is held on the top of the nail. The nail should be driven vertically even if the stake is in an inclined position.

ERRORS OF LEVELING.

The General Instructions for Precise Leveling by the United States Coast and Geodetic Survey, shown on pages 8 to 12, are designed to minimize or eliminate from a line of levels the effect of all known sources of accidental and systematic errors. Under the heading "Comments on the General Instructions," the reasons for adopting certain methods are given in order to supplement the instructions where they are not considered to be in sufficient detail to show clearly the object sought.

Many of the sources of errors in leveling of any kind are self-evident, and the observer will guard against them by properly adjusting his instrument and rods and by the use of firm rod supports.

MISTAKES OR BLUNDERS.

Mistakes or blunders are especially to be guarded against, as they may cause great expense and annoyance on engineering projects before they are discovered. Such mistakes are usually caused by—

(1) Reading a rod 1 meter or decimeter wrong on both the forward and the backward runnings of a section.

(2) Undetected disturbance of a temporary bench mark.

(3) The recorder reversing the backsights and foresights at a station on each of the two runnings of a section.

(4) Not connecting a permanent bench mark with the line of levels until after the two runnings have been made.

The mistake in rod reading is most likely to occur when changing at a bench mark from the forward to the backward running or vice versa, or at a decided change in grade. The instructions provide that after the first running to a bench mark the second must not be immediately started back from that mark. While running on a long even grade both the observer and the recorder should be on the alert for a change of grade when the reading for the foresight and probably the backsight also may fall on a different meter space on the rod from what it had been during a number of previous stations. The mistake of a whole meter is the only one likely to occur at the change of grade. The probability of an undetected mistake of a decimeter or meter occurring in a line run in accordance with the general instructions is so small that it has been deemed inadvisable to have two faces of the rod graduated with different scales and have both of them read, on account of the greater amount of work involved and the slower progress in consequence.

The instructions, page 11, state that any temporary bench mark which is required to hold the elevation of the forward end of the line must consist of two stakes or other objects set apart the distance between two rod points. These two objects are connected with when the leveling is advanced from them later and any discrepancy between their original and new differences in elevation is noted before proceeding. With this method any disturbance of the mark is detected.

The transposition of backsight and foresight will probably never be undetected in Coast and Geodetic Survey leveling, for it is not customary on the second running for the rods to be held at the same points as on the first running. Consequently, should such an error be made on each of the two runnings of a section, it is most improbable that the two errors would be so nearly the same that the two runnings would agree within the prescribed limit $4^{mm}.0 \sqrt{K}$, K being the distance in kilometers.

Paragraph 33 (page 11) of the general instructions provides a method of tying in a bench mark to a completed line, which should prevent blunders. A mistake made in the elevation of a bench mark connected with a completed line will not affect the elevation as carried ahead, but it may cause serious trouble in any future leveling based on that mark.

ACCIDENTAL AND SYSTEMATIC ERRORS.

With accurately adjusted instrument and rods, firm rod supports, and an instrument of the type of the Coast and Geodetic Survey level, which is made almost entirely of nickel-iron alloy of low coefficient of expansion, there would appear to be no source of systematic error in the mean of the forward and backward runnings of a line of levels if the observing is done in

accordance with the general instructions shown on pages 8 to 12. The closing errors of circuits show, however, that the systematic errors are not entirely eliminated.

The accidental errors will be present under any method of operation, and other things being equal they will increase with the increase in the rapidity of the progress of the work beyond a certain normal amount. The observers in the United States Coast and Geodetic Survey are directed to do as much leveling as possible of a certain accuracy (as indicated by the agreement of the two separate measures of each section of a line) rather than a smaller amount of a greater accuracy. They make the lines of sight as long as the atmospheric conditions will permit, up to a maximum of 150 meters. The greatest sources of accidental errors are believed to be in bisecting the centimeter graduations on the rod and the varying vertical refraction on the backsights and foresights. Another source of error (probably entirely accidental under the method of leveling prescribed) is the inertia of the liquid in the level vial. The observer should bring the bubble to rest at the center and then wait a few seconds to see whether or not it creeps to another position. If it moves away from the central position it should be brought back before making the reading of the rod. An error, probably mostly accidental, may be caused by refocusing the rod image between the two sights at an instrument station. This would probably change the relation between the axis of the bubble and the line of collimation.

Paragraph 35 of the instructions refers to the accumulation of the discrepancy or the divergence between the elevations as carried by the forward and backward runnings of a line of levels. It is rarely the case that both runnings are made on the same day, but the interval of time between them is very seldom more than one week.

It is evident that early in a line of levels run by a new party the value of the discrepancy between the backward and forward measures (B-F) in millimeters per kilometer tends to be large, but after about the first 20 kilometers it settles down. About 0.25 millimeter per kilometer, as the line progresses, is a good value, tending to decrease to the end of the line. Any noticeable tendency of the discrepancy to be of one sign is a thing to be guarded against, studied, and, if possible, counteracted.

There is no reason for the office computations to affect the value of the B-F systematically in either direction. The two principal corrections for rod length and for temperature are usually about equal on the backward and forward lines and of the same sign as the difference of elevation and, therefore, do not affect the B-F.

The effects of the sun, the grade of the line, the average temperature, and the azimuth of the line on the accumulation of B-F are not known. Therefore, the methods are designed to eliminate them from the observations or at least to reduce them by providing that the running of the backward and forward lines shall be under different conditions. The rapid accumulation, in most cases, has been found to be due to the habits of the rodman or to the methods of supporting the rods.

When the accumulation is large the observer should make various experiments, such as (1) the occasional use of the foot pins for a few miles; (2) a change of rodmen; (3) requiring the rodmen to try various changes in their methods of locating and holding their rods and especially requiring them to be unusually careful in placing the rod in its horizontal location on the rail and in the amount of pressure placed on the rod by leaning on it or by bracing against wind pressure; (4) changing the program of running forward in the forenoon and backward in the afternoon to backward in the forenoon and forward in the afternoon. Then he should study the relation of the accumulated discrepancy, first, to each of the above-mentioned changes; second, to the weather; third, to changes in the character of the ballast; fourth, to changes of grade of the railroad. By such studies the source of the trouble will probably be located or else the accumulation will cease without the reason for its doing so being discovered.

The rodmen should be especially careful when the railroad is in poor condition, with the top of the rail irregular and not flat. A shifting of the horizontal position of the rod of 1 millimeter between the foresight and backsight might easily cause an error of 0.1 millimeter for the top surface of the rail may slope as much as 10 per cent.

It is believed that the larger accumulated discrepancies can not possibly arise from any systematic error in reading the rods. Especially is this true in leveling, such as that called

for by the General Instructions (par. 18, p. 10), where the back sight is read first at stations of odd numbers and the foresight first at the remaining stations. This makes it practically a symmetrical process in so far as the observer is concerned. (The primary purpose of this feature of the program is to eliminate from the final computation of elevations the effect of any systematic tendency of the instrument to rise or settle during observations.)

There is a possibility of an accumulated discrepancy being produced by refraction on lines having steep grades. If the conditions in regard to refraction be the same on the two runnings of a line, there would be no divergence from that cause; but it is probable that the refraction is different on the higher sight than the lower one and that this difference changes during the day as the relative temperatures of the ground and air vary. The refraction on the higher sight (up the slope) is no doubt different in the morning with a rising temperature from what it is in the afternoon with a falling temperature, while the lower sight (down the slope) which comes well above the surface of the ground will not vary so much between the forenoon and afternoon. Consequently, if the observer systematically leveled forward early in the day and backward late in the day, refraction might cause an accumulated discrepancy. If it does, there should be a change of sign in the discrepancy when the program is reversed by leveling backward in the morning and forward in the afternoon. Also, without a change of program a change of sign should occur after passing a summit or the lowest point in a valley.

It is difficult to see how a large accumulated discrepancy could be caused by errors due to a difference in the appearance of the rods, one being more brightly illuminated than the other, but if such is the case a change in the program of forward in the morning and backward in the afternoon to forward in the afternoon and backward in the morning would tend to change the sign. (See also third paragraph under Accidental and Systematic Errors, p. 19.) The discrepancy, if due to the appearance of the rods, would not increase on portions of a line run in both directions on cloudy days, and the change of program would probably not be effective on a line running north and south.

A test similar to that mentioned above might be made to show whether the accumulation is due to the tendency of the bubble to crawl toward the source of heat—the sun.

Among the cases of large accumulations of discrepancy between the two runnings of a line are: (1) A section of the line from Ogden, Utah, to Pocatello, Idaho, where a discrepancy of 63.4 millimeters occurred on 138.4 kilometers, a rate of 0.46 millimeter per kilometer. (2) On the line Red Desert to Azusa, Wyo., there was an accumulated discrepancy of 89.1 millimeters on 170.4 kilometers, or 0.52 millimeter per kilometer.

If there is a systematic error due to the direction of running which causes the accumulated discrepancy, it is probable that this error, with different signs in the two runnings, is practically eliminated from the mean of the two runnings.

If there is a systematic error in a line due to its having been run in the forenoon, which is of the same size but of different sign from a systematic error in the same line, caused by its having been run in the afternoon, then if there are no other sources of error the two lines will differ by twice the systematic error in the single line, but the mean will be free from this error. Now, if one-half of the above line is measured forward in the forenoon and the other half forward in the afternoon, and if the backward running is made half in the forenoon and half in the afternoon, then the difference in elevation of the ends of the line from each of the two runnings will be free from systematic error and they will give the same difference in elevation for the two ends of the line. It seems to be reasonably certain that in so far as the errors due to forenoon and afternoon runnings and to the direction in which the line is run are concerned, the amount of the accumulated discrepancy is not an indication of the size of the systematic error which may be present in the line, for the systematic errors in each of the backward and the forward runnings due to these causes may be made to accumulate or eliminate themselves by a change of program without affecting the difference in elevation as given by the mean of the two lines. (See also discussion under Relation between the systematic error and the value of $B-F$, p. 22.)

In making certain astronomic observations where extreme accuracy is required it has been found that most observers have a personal equation in bisecting a star with the wire.

This may be called the "bisection error." This error is eliminated from the results by means of a reversing prism, which if turned 90° reverses the image formed on the retina of the eye and one-half the observations are made in each of the two positions. It is no doubt true that there is a "reversing error" for some observers in reading the fractions of a division of the level rod, but as the same error would presumably be made on both the front and back rods these errors would not come into the line of levels. It may be the case, however, that the "bisection error" on a rod illuminated by the direct rays of the sun is different from that on a rod the face of which is in shadow. It is possible that this phenomenon is one of the causes or the cause of the accumulation of the difference (B-F) between the forward and backward runnings of a line when one of the runnings has been made entirely toward the sun, while the other has been made in a direction away from the sun. On an east and west line the effect of this error (if it exists) will probably be eliminated from the mean of the two runnings, but this would not be the case on a line which is nearer north and south than east and west. It may be desirable where extreme accuracy is required to have a reversing prism on the level and readings made on the rod in both positions of the prism.

After an observer has taken every known precaution to eliminate the effect of errors on the elevations of a line it will usually be found that the closing error of the loop or loops involving the line is greater than can be attributed to the purely accidental errors. There must be systematic errors in the leveling which affect the mean of the forward and backward runnings, although the instrument may be in perfect adjustment, the constants of the rods accurately determined, the rod supports entirely satisfactory, and the two runnings made on different days and under different atmospheric conditions as far as rising and falling temperatures are concerned.

ERRORS DUE TO ATMOSPHERIC CONDITIONS.

There is usually some systematic error in a single running of a line, the size and sign of which probably depend upon the direction of the running with respect to the sun, the time of day, or the movement of the air or possibly upon all of these three causes combined. Observers have reported that the two runnings of a section on a clear day or days agree more closely when the wind has a decided velocity than when the wind is very light or it is calm. This seems to be possible, for when the air is in motion the temperature is more likely to be uniform throughout the layers through which the line of sight passes, and the refraction should be more nearly the same on the back and forward sights.

The errors outside of the instrument and the observer which may affect a single running in a systematic manner can be made to act as accidental errors by running the second measure under the opposite conditions. For instance, if the first running has been made in the forenoon with a rising temperature and with the sun to the eastward the second measure should be made in the afternoon with a falling temperature and with the sun to the westward. This does not apply to cloudy days, when it is believed the systematic errors due to atmospheric conditions are negligible.

It is possible that there is an error in the mean of the two measures of a section where one running is made on a clear and the other on a cloudy day, but it would be difficult to show that this is true, for any systematic error on a short section of a line (say 1 kilometer) is very small compared with the accidental errors.

SYSTEMATIC ERRORS ON SLOPES.

It is believed that systematic errors are more likely to occur on steep grades if the observing is done at times when the surface of the ground and the air have different temperatures. If the air has a uniform temperature, or temperatures varying uniformly with the height above sea level, then the density of any layer of air at a certain elevation above sea level will be the same throughout the layer. The effect of barometric pressure and the hygrometric condition of the atmosphere at different points within the distance considered (300 meters between the two rods) may be considered as having no effect in causing a different density in the layer. Under this condition of uniform temperature, or temperatures varying uniformly with regard to elevation above sea level, there will be the same amount of refraction on the backsights

and foresights when these are of equal length. But when the air and the surface of the ground have different temperatures the layer of air in contact with the surface will assume a temperature nearly that of the ground and consequently the density of the air will tend to vary with its distance from the surface of the ground instead of with the elevation above sea level. (This will of course be true for only a short distance from the ground, say 1 or 2 meters.) If the ground is level there will be no difference in the amount of refraction on the two sights, but if the ground is sloping the sight up the slope will pass through layers of air of different densities, while the lower sight will go through air in a normal state so far as the arrangement of its densities is concerned. The effect of the refraction on the rod reading on the upper sight will be of one sign if the surface of the ground is colder than the air, and the opposite sign if the surface is warmer than the air. These errors are no doubt smaller when the wind is blowing and the air stirred. On cloudy days the temperature of the air and the surface of the ground are supposed to be more nearly the same and consequently the refraction error on the slope would not be so large as on a clear day. The refraction error on a clear day should be at a minimum during the several hours in the middle of the day when the temperatures of the air and the surface of the ground are nearly the same, and greatest in the morning and the late afternoon, but should have opposite signs during those two periods.

As stated above, this refraction error should be entirely absent if the ground is level or nearly so and the backsights and foresights at a station are equal in length. It should reach a maximum on steep grades where the line of sight up the slope comes very close to the bottom of the rod. This error may be made small by never letting the line of sight come near the ground. It is impossible to predict what the safe height is, but it is believed that if the lower one of the three wires reads more than 30 centimeters above the ground most of the trouble will be avoided.

RELATION BETWEEN THE SYSTEMATIC ERROR AND THE VALUE OF B-F.

The value of the accumulated difference between the two runnings of a line does not, in the writers' opinion, give an accurate idea of the size of the systematic error in the line. This value of B-F as a rule can be controlled by the observer varying the program of his work. It might be possible to hold the value of B-F nearly to zero, or the value might be very large, yet the mean of the two runnings would be the same in each case. The best measure of the systematic error is believed to be in the loop closures, and for this purpose small loops are better than large ones. In that portion of the United States to the west of the Mississippi River the loops in the precise level net are, as a rule, very large at present. The leveling planned for the future will cut up those large loops into a number of smaller ones.

For additional remarks on the errors of leveling, see "Comments on the General Instructions," on pages 12 to 14.

EXAMPLES OF RECORD AND COMPUTATION.

A specimen * of the determination of *C* as actually made in the field in accordance with paragraph 12 of the General Instructions is given below, together with suggestions which were furnished to the observers.

Determination of <i>C</i> , 8.20 a. m., August 28, 1900.			
Left-hand page.		Right-hand page.	
Number of station.	Thread reading, backsight.	Mean.	Thread interval.
A	1515	1528.3	13
	1528		14
	1542		27
B	2252	2357.0	105
	2357		105
	2462		210
		0461.7	419
		2818.7	52
Cor. for curv. and ref.		-0.8	367
		2817.9	
Rod.	Thread reading, foresight.	Mean.	Thread interval.
W	0357	0461.7	105
	0462		104
	0566		209
W	1276	1288.3	12
	1288		13
	1301		25
		1528.3	
		2816.6	
		2817.9	
		367) -1.3 (-0.004=C	

* The unit of length used in this specimen is the millimeter.

Only the distant rod readings need be corrected for curvature and refraction, and the two corrections for the two distant rods may be combined as indicated.

Note that if the transfers of figures across from page to page are made as indicated all subtractions are made right side up.

Do not carry *C* to more than three decimal places.

When the instrument must be adjusted, due to too large a value for *C*, do it by raising or lowering one end of the level vial and *not by moving the reticle*.

The adjustment is made as follows: Point to a distant rod with the bubble in the middle of its tube, and read. Move the telescope so as to raise the middle line by an amount equal to *C* times the rod interval. While holding the telescope in this position bring the bubble to the middle of the tube by raising or lowering one end of the level vial. If *C* is negative the middle line must of course be lowered on the rod.

The following examples of the record and computation will serve to explain the method of observation still further:

Left-hand page.

Spirit leveling.

Right-hand page.

Date: August 29, 1900.

Forward-Backward.

From B. M.: 68

To B. M.: G.

Sum: C.

(Strike out one word.)

Wind: S. T

No. of station.	Thread reading, backsight.	Mean.	Thread interval.	Sum of intervals.	Rod and temp.	Thread reading, foresight.	Mean.	Thread interval.	Sum of intervals.
43	0674	0772.0	99		V	2683	2782.3	99	
	0773		99		33	2782		100	
	0872		198			2882		199	
44	0925	1030.3	106	408	W	2415	2518.0	103	405
	1031		104		35	2518		103	
	1135		210			2621		206	
45	0484	0582.3	98	605	V	2510	2606.0	96	597
	0582		99		35	2606		96	
	0681		197			2702		192	
46	0398	0495.0	97	799	W	2859	2954.7	96	788
	0495		97		34	2955		95	
	0592		194			3050		191	
47	1027	1053.3	26	852	V	1006	1034.7	29	845
	1053		27		34	1035		28	
	1080		53			1063		57	
							11895.7		
							-7961.8		
							2:25 p. m		

The explanation of the symbols used after the words "Sun" and "Wind" is printed on the bottom of the computation form shown later. The unit in the record is the millimeter. The instrument stations (not turning points) are numbered consecutively throughout the day. A rod once placed at a point stays there, both for the foresight and backsight, each rodman thus being front and back rodman alternately. To carry out the requirement of the general directions, that at stations of odd numbers the backsight is to be taken before the foresight, and at even stations the foresight is to be taken first, it is only necessary to remember that this is equivalent to the statement that one particular rodman must always show his rod first after each placing of the instrument. The position of the rod is indicated in the record on the foresight only. The temperature is read by the back rodman just before he moves forward, and is called out to the recorder when the rodman passes.

The columns headed "Thread interval" show the intervals between the lower and middle threads as seen projected on the rod, and the middle and the upper, and finally the total interval. The columns headed "Sum of intervals" show the continuous sum of the total intervals, and as these values are proportional to the sums of the backsight distances and foresight distances, respectively, they enable the observer to keep these two sums nearly equal at all times, as required by the instructions, for the purpose of eliminating instrumental errors.

Such portions of the computation as are shown as forming a part of the record are kept up by the recorder as the work progresses. The instrument is not moved forward from any station until the recorder announces that the readings at that station check properly. The recorder uses, as a short method of computing the mean of the three thread readings, the fact that the difference of the upper and lower intervals divided by 3 is the correction to be applied with the proper sign to the middle thread reading to give the mean of the three.

But little explanation is needed in connection with the computation form shown on page 25. The forward line from B. M. 68 to B. M. G. on this form is that for which the record is given.

The fifth column on the left-hand page is derived from the fourth by using the sufficiently exact relation that 287 millimeters subtended on the rod corresponds to 100 meters along the line, regardless of the lengths of the separate sights.

The corrections for curvature and refraction shown in the first column of the right-hand page are those due to the slight differences of corresponding foresights and backsights, no correction being necessary when the corresponding sights are exactly equal. The correction is usually inappreciable and seldom exceeds 0.1 millimeter under actual conditions. It may be applied very quickly by the use of tables (see pp. 26 to 29) and a rapid inspection of the record books. It is important to note that this is, in the main, a correction for curvature, a quantity which is not uncertain, the uncertain refraction being upon an average about one-eighth as great as the curvature.

The level correction shown in the second column of the right-hand page is equal to the constant *C* (defined in paragraph 21 of the general instructions) times the value in the sixth column of the left-hand page. Its sign is fixed by the signs of the two factors. This correction will very seldom exceed 0.3 millimeter under actual conditions and will not sensibly differ from zero on most sections, since the instructions require (par. 11) that the sum of the foresight rod intervals on any section shall be nearly equal to the sum of the backsight rod intervals.

The third column is for the index error which takes account of the fact that the zero of graduation and the foot of the rod are not exactly coincident. As the index errors of two rods forming a pair are made the same this correction is necessary only when a metal tape is used on a bench mark that is not accessible with a rod.

The fourth column gives the correction due to the excess of length of the rod at zero degrees, this particular rod being 0.28 millimeter too long on each meter. The examinations of the rods made at the office show that the error of graduation is, with sufficient accuracy, proportional to the distance along the rod. The next column gives the correction due to the expansion of the rod from zero to the temperature of observation, computed with the known coefficient of expansion of the rods, namely, 0.000004 per degree Centigrade. The sum of the quantities in the third and fourth columns in any line gives the correction due to the excess of length of the rod at the temperature of observation. For these particular rods, which are long, even at zero, the correction in each of these columns will always have the same sign as the measured difference of elevation.

The last four columns on this form are for use whenever special studies are to be made to determine, if possible, the sources of the principal errors of leveling. It should be noted that the times of the backward and forward runnings of any section, as indicated in the last column, have no fixed relation to each other. The two runnings are sometimes made on the same day, sometimes on different days, and in some instances they both occur in the forenoon, at other times both in the afternoon, and frequently they occur in opposite halves of the day. Any long portion of the line will show corresponding forward and backward measurements having all possible relations to each other as to the time of day.*

* The present practice is to have the two runnings on different days and at different times of the day if practicable.

Right-hand page.

Observer: W. H. B. Year: 1900.

Computation of precise levels.

Left-hand page.

Line: Somerset, Ky., to Knoxville, Tenn.

Bench marks.	For-ward or back-ward.	Num-ber of sta-tions.	Sum of inter-val.	Dis-tance in kilo-meters. ΣB - ΣF .	Mean rod readings.		Approx-imate difference of elevation.	Mean tem-perature of rods.	Corrections.				Difference of ele-vation.		Toward or from sun.	Sun-shine or cloudy.	Wind.	Date and hour.
					ΣB	ΣF			Curva-ture and refrac-tion.	Level error.	Index error.	Length of rod.	Tem-perature of rod.	Each line.				
65-66	F	9	mm. 3669	1.279	mm. 10.6532	mm. 19.0087	m. -8.3555	37	mm. +0.1	mm. -0.1	mm. 0.0	mm. -2.4	mm. -1.2	m. -8.3591	L.	S	C	8/28-9:15
66-67	B	7	3675		15.1650	6.8087	+8.3563	26	+0.1	-0.1		+2.4	+0.8	-8.3595		C	C	8/29-9:00
67-68	F	8	3738	1.302	17.6667	10.4370	+7.2297	32	+0.1	-0.1		+2.1	+0.9	+7.2326	T.	C	C	8/29-11:05
68-G	B	7	3739		7.8223	15.6537	-7.2314	23	+0.1	+0.2		-2.1	-0.6	+7.2338		C	C	8/29-7:45
69-70	F	13	4198	1.464	15.5276	31.8222	-16.2946	33	+0.1	+0.1		+4.6	-2.1	-16.3013		S & C	C	8/29-1:30
70-71	B	8	4206		21.5524	5.2587	+16.2937	28	+0.1	-0.1		+4.6	+1.8	+16.3003		C	C	8/29-5:00
71-72	F	6	1607	0.590	3.9339	11.8957	-7.9618	35				+2.3	-1.1	+7.9653	R.	C	S	8/29-2:15
	B	6	1691		12.5887	4.8979	+7.9608	31				+2.3	+1.0	+7.9641		C	C	8/31-9:10
	F	11	5126	1.785	28.4990	5.8171	-22.6819	30				+6.5	+2.7	+22.6911		S & C	T S	8/29-3:15
	B	12	4589	1.602	17.3855	23.9368	-22.6818	27	+0.1	-0.1		-1.4	-0.4	-22.6908		F M	C	8/31-8:30
	F	9	4607		17.5312	22.7719	-4.9964	22				+5.8	-2.0	+4.9920		C	C	8/30-7:15
	B	10	5000	1.740	26.8333	12.1410	+20.2441	25				+3.8	+1.9	+20.2519		C	C	8/30-4:30
	F	10	4987		6.5770	27.7772	-20.2463	24	+0.1			-3.4	-2.0	+20.2541		C	C	8/30-8:15
	B	10	4076	1.420	10.5865	6.5770	+15.4875	33				+3.4	+1.6	+15.4939	L.	S	C	8/30-9:15
	F	8	4073		21.0375	5.5510	+15.4885	26				+3.4	+1.6	+15.4925		C	C	8/30-2:40

Abbreviations: S=sunshine. C=cloudy. S & C=alternate sunshine and shade.

Abbreviations, strength of wind: S=strong. M=moderate. C=calm.

Abbreviations, direction of progress relative to sun:

T=within 45° of directly toward sun. F=from

R=right and nearly at right angles to line. The same abbreviations also apply to the direction of progress relative to the wind.

L=sun to left

The following abstract of results is the form actually used in collecting the results of the computation indicated above. It is essentially a summary and combination of the values derived on the computation form. The computation is discontinuous, showing results from separate sections, while this abstract is continuous.

Left-hand page.

Abstract of spirit-level results.

Right-hand page.

State: Tennessee. Instrument: Level No. 8. Rods: V. & W.

Observer: W. H. B. Computers: W. H. D.
W. H. B.

Date.	From B. M. to B. M.	Dis- tance in kilo- meters.	Difference of elevation.			Discrepancy.		No. of B. M.	Distance from B. M. A ₁ at Ludlow, Ky.	Elevation above mean sea level.	Locality.
			Forward line.	Back- ward. line.	Mean.	Par- tial.	Total accumu- lated.				
Aug. 28-29	55-56	1.279	m. - 8.3591	m. + 8.3595	m. - 8.3593	mm. - 0.4	mm. +108.7	65	km. 355.545	m. 424.5262	Stone post at Sun- bright, Morgan County, Tenn.
29	66-67	1.302	+ 7.2326	- 7.2338	+ 7.2332	+1.2	+109.9	67	367.150	431.7594	
28-29	67-68	1.464	-16.3013	+16.3003	-16.3008	+1.0	+110.9	68	368.614	415.4586	
29-31	68-G	0.990	- 7.9653	+ 7.9641	- 7.9647	+1.2	+112.1	G	369.204	427.4039	
29-31	G-69	1.785	+22.6911	-22.6908	+22.6910	-0.3	+111.8	69	370.989	430.1849	
30	69-70	1.602	+ 4.9882	+ 4.9920	+ 4.9901	-3.8	+108.0	70	372.591	425.1948	
30	70-71	1.740	-20.2519	+20.2541	-20.2530	-2.2	+105.8	71	374.331	404.9418	
30	71-72	1.420	-15.4939	+15.4925	-15.4932	+1.4	+107.2	72	375.751	389.4486	

CORRECTION TABLES.

For convenience there are inserted here three tables which are useful in making the fore-going computations.

The table of total correction for curvature and refraction is for use in computing C, in making river crossings, and in general wherever the total correction is required. In computing this table the refraction was assumed to be equal to one-eighth the curvature.

Total correction for curvature and refraction.

Distance.	Correction to rod read- ing.	Distance.	Correction to rod read- ing.
m. m.	mm.	m. m.	mm.
0 to 27	0.0	160	-1.8
28 to 47	-0.1	170	-2.1
48 to 60	-0.2	180	-2.3
61 to 72	-0.3	190	-2.6
73 to 81	-0.4	200	-2.8
82 to 90	-0.5	210	-3.0
91 to 98	-0.6	220	-3.3
99 to 105	-0.7	230	-3.7
106 to 112	-0.8	240	-4.0
113 to 118	-0.9	250	-4.3
119 to 124	-1.0	260	-4.7
125 to 130	-1.1	270	-5.0
131 to 136	-1.2	280	-5.4
137 to 141	-1.3	290	-5.8
142 to 146	-1.4	300	-6.2
147 to 150	-1.5		

The table for the differential correction for curvature and refraction is for use in deriving the corrections shown in the first column of the right-hand page of the computation indicated on page 25. The table was computed upon the assumption that the refraction is one-eighth of the curvature, and that the stadia interval for the instrument is such that the distance from the instrument to the rod in meters is one-third of the interval subtended on the rod in millimeters. An inspection of the table will show that it is sufficiently accurate for use even though the stadia interval differs from that stated by 10 per cent or more.

Differential correction for curvature and refraction.

Mean length of sight in rod interval in millimeters.	Difference of sights in rod interval in millimeters.																												
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
10	.0	.0	.0	.0	.0																								
20	.0	.0	.0	.0	.0	.0																							
30	.0	.0	.0	.0	.0	.0	.0																						
40	.0	.0	.0	.0	.0	.0	.0	.0																					
50	.0	.0	.0	.0	.0	.0	.0	.0	.0																				
60	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0																		.1	.1
70	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0															.1	.1	.1	.1
80	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0													.1	.1	.1	.1	.1
90	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0											.1	.1	.1	.1	.1	.1
100	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0									.1	.1	.1	.1	.1	.1	.1
110	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1								.1	.1	.1	.1	.1	.1	.1
120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1								.1	.1	.1	.1	.1	.1	.1
130	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1								.1	.1	.1	.1	.1	.1	.1
140	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1							.1	.1	.1	.1	.1	.1	.1
150	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1						.1	.1	.1	.1	.1	.1	.1
160	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1					.1	.1	.1	.1	.1	.1	.1
170	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1				.1	.1	.1	.1	.1	.1	.2
180	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1			.1	.1	.1	.1	.1	.2	.2
190	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1		.1	.1	.1	.1	.2	.2	.2
200	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1		.1	.1	.2	.2	.2	.2
210	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1		.2	.2	.2	.2	.2
220	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1		.2	.2	.2	.2
230	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1		.2	.2	.2
240	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2		.2	.2
250	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2		.2
260	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
270	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
280	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
290	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3
300	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3
310	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3
320	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3
330	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3
340	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3
350	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3
360	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3
370	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.4
380	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.4	.4
390	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.4	.4	.4
400	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.4	.4	.4	.4
410	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.3	.3	.4	.4	.4	.4	.4
420	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4
430	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
440	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
450	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
460	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
470	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
480	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
490	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
500	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
510	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4
520	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4

The sign of this correction is positive when the foresight is the longer, that is, when the stadia interval subtends more divisions on the rod for the foresight than for the backsight.

The differential correction for curvature and refraction may also be taken from the following table, which is sometimes more convenient. It gives, for a given difference of rod intervals, the lower limiting values of the mean rod interval for which the correction is (to the nearest tenth of a millimeter) 0.1 millimeter, 0.2 millimeter, etc.

Thus, for a difference of rod intervals of 37 millimeters, there are given in the table the numbers 88.6, 265.8, and 442.9, under the respective headings 0.1 millimeter, 0.2 millimeter, 0.3 millimeter. This means that up to 88.6 millimeters the correction is 0.0 millimeter to the nearest tenth, from that point up to 265.8 the correction is 0.1 millimeter to the nearest tenth, and between 265.8 and 442.9 it must be taken as 0.3 millimeter.

The table is computed on the same assumptions as the preceding table, and the rule for the sign of the correction is the same, namely, positive when the foresight is the longer of the two sights, negative when it is the shorter. Numbers over 460 are omitted from the table.

Differential correction for curvature and refraction.
LIMITING VALUES OF THE MEAN ROD INTERVAL.

Difference of rod intervals.	Correction.				Difference of rod intervals.	Correction.			
	0.1 mm.	0.2 mm.	0.3 mm.	0.4 mm.		0.1 mm.	0.2 mm.	0.3 mm.	0.4 mm.
<i>mm.</i>					<i>mm.</i>				
8	409.7				35	93.7	281.0		
9	364.2				36	91.0	273.2	433.2	
10	327.8				37	88.4	265.4	442.9	
11	298.0				38	86.3	258.8	431.3	
12	273.2				39	84.0	252.1	420.2	
13	252.1				40	81.9	245.8	409.7	
14	234.1				41	79.9	239.8	399.7	
15	218.5				42	78.0	234.1	390.2	
16	204.9				43	76.2	228.7	381.1	
17	192.8				44	74.5	223.5	372.5	
18	182.1				45	72.8	218.5	364.2	
19	172.5				46	71.3	213.8	356.3	
20	163.9				47	69.7	209.2	348.7	
21	156.1				48	68.3	204.9	341.4	
22	149.0				49	66.9	200.7	334.5	
23	142.5	447.0			50	65.6	196.7	327.8	438.9
24	136.6	427.5			51	64.3	192.8	321.4	449.9
25	131.1	407.9			52	63.0	189.1	315.2	441.2
26	126.1	393.3			53	61.8	185.5	309.2	432.9
27	121.4	378.2			54	60.7	182.1	303.5	424.9
28	117.1	364.2			55	59.6	178.8	298.0	417.2
29	113.0	351.2			56	58.5	175.6	292.7	409.7
30	109.3	339.1			57	57.5	172.5	287.5	402.5
31	105.7	327.8			58	56.5	169.5	282.4	395.6
32	102.4	317.2			59	55.6	166.7	277.8	388.9
33	99.3	307.3			60	54.6	163.9	273.2	382.4
34	96.4	298.2							

The table of temperature corrections is for use in deriving the values shown in the fifth column of the right-hand page of the computation indicated on page 25, the length of the rod at zero degrees Centigrade having been used in deriving the third column. The table is computed on the assumption that the coefficient of expansion of the rod is four parts in a million per degree Centigrade. The sign of the correction is always the same as the sign of the measured difference of elevation unless the temperature is below the Centigrade zero.

Correction for temperature (in millimeters).

Temp. C.	Difference of elevation in meters.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
2	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1
3	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.2	.2
4	.0	.0	.0	.1	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2
5	.0	.0	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.3	.3
6	.0	.0	.1	.1	.1	.1	.2	.2	.2	.2	.3	.3	.3	.3
7	.0	.1	.1	.1	.1	.2	.2	.2	.3	.3	.3	.3	.4	.4
8	.0	.1	.1	.1	.2	.2	.2	.3	.3	.3	.4	.4	.4	.4
9	.0	.1	.1	.1	.2	.2	.2	.3	.3	.4	.4	.4	.5	.5
10	.0	.1	.1	.2	.2	.2	.3	.3	.4	.4	.4	.5	.5	.6
11	.0	.1	.1	.2	.2	.3	.3	.4	.4	.4	.5	.5	.6	.6
12	.0	.1	.1	.2	.2	.3	.3	.4	.4	.5	.5	.6	.6	.7
13	.0	.1	.2	.2	.3	.3	.4	.4	.5	.5	.6	.6	.7	.7
14	.1	.1	.2	.2	.3	.3	.4	.4	.5	.6	.6	.7	.7	.8
15	.1	.1	.2	.2	.3	.4	.4	.5	.5	.6	.7	.7	.8	.8
16	.1	.1	.2	.3	.3	.4	.4	.5	.6	.6	.7	.8	.8	.9
17	.1	.1	.2	.3	.3	.4	.5	.5	.6	.7	.7	.8	.9	.9
18	.1	.1	.2	.3	.4	.4	.5	.6	.6	.7	.8	.9	.9	1.0
19	.1	.2	.2	.3	.4	.5	.5	.6	.7	.8	.8	.9	1.0	1.1
20	.1	.2	.2	.3	.4	.5	.6	.6	.7	.8	.9	1.0	1.0	1.1
21	.1	.2	.2	.3	.4	.5	.6	.7	.8	.8	.9	1.0	1.1	1.2
22	.1	.2	.3	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.1	1.2
23	.1	.2	.3	.4	.5	.6	.6	.7	.8	.9	1.0	1.1	1.2	1.3
24	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.2	1.3
25	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
26	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.5
27	.1	.2	.3	.4	.5	.6	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5
28	.1	.2	.3	.4	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.6
29	.1	.2	.4	.5	.6	.7	.8	.9	1.0	1.2	1.3	1.4	1.5	1.6
30	.1	.2	.4	.5	.6	.7	.8	1.0	1.1	1.2	1.3	1.4	1.6	1.7
31	.1	.2	.4	.5	.6	.7	.9	1.0	1.1	1.2	1.4	1.5	1.6	1.7
32	.1	.3	.4	.5	.6	.8	.9	1.0	1.2	1.3	1.4	1.5	1.7	1.8
33	.1	.3	.4	.5	.7	.8	.9	1.1	1.2	1.3	1.4	1.6	1.7	1.8
34	.1	.3	.4	.5	.7	.8	1.0	1.1	1.2	1.4	1.5	1.6	1.8	1.9
35	.1	.3	.4	.6	.7	.8	1.0	1.1	1.3	1.4	1.5	1.7	1.8	2.0

Correction for temperature (in millimeters)—Continued.

Temp. C.	Difference of elevation in meters.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
35	.1	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.4	1.6	1.7	1.9	2.0
37	.1	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1
38	.1	.3	.5	.6	.8	.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1
39	.2	.3	.5	.6	.8	.9	1.1	1.2	1.4	1.6	1.7	1.9	2.0	2.2
40	.2	.3	.5	.6	.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2
41	.2	.3	.5	.7	.8	1.0	1.1	1.3	1.5	1.6	1.8	2.0	2.1	2.3
42	.2	.3	.5	.7	.8	1.0	1.2	1.3	1.5	1.7	1.8	2.0	2.2	2.3
43	.2	.3	.5	.7	.9	1.0	1.2	1.4	1.5	1.7	1.9	2.1	2.2	2.4
44	.2	.3	.5	.7	.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3	2.5
45	.2	.3	.5	.7	.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.3	2.5

STATISTICS OF LINES.

The principal items of information in regard to the Coast and Geodetic Survey level lines are given in the tables below in the same form as the tables on pages 224–225 of Appendix 3, Report for 1903, and pages 14 and 15 of "Precise Leveling in the United States, 1903–1907," arranged in such a manner as to be conducive to comparison between lines.

The number of permanent bench marks includes all with which the leveling was directly connected, regardless of whether they are new bench marks or bench marks previously established by some other party or organization.

The average distance between bench marks was obtained by dividing the total length of the main line by the number of permanent bench marks.

The speed was obtained by dividing the total length of the line by the interval in months from the date of the first leveling to the date of the last, inclusive. The expression "total length" refers to the completed line. Each completed section of the line was leveled at least twice, and in some cases four or more times. To obtain the speed in terms of single line one must therefore multiply the speed here given by a factor somewhat greater than two.

The discrepancy in millimeters per kilometer was obtained by dividing the total discrepancy on the main line by the length of the main line.

The probable error of the mean result for a section was computed by the formula

$$r'' = 0.674 \sqrt{\frac{\sum d^2}{4s}}$$

in which d is the discrepancy between the forward and backward leveling over a section and s is the number of sections. The probable error for 1 kilometer, r_1 , was derived by assuming that the average length of a section is to 1 kilometer as $(r'')^2$ is to r_1^2 .

Line.	San Diego to Barstow, Cal.	Pocatello, Idaho, to Butte, Mont.	Ogden to Salt Lake City, Utah, and Barstow, Cal., to Las Vegas, Nev.	Butte to Huntley, Mont.	Las Vegas, Nev., to Zenda, Utah.	Salt Lake City to Zenda, Utah.
Observer.....	E. H. P.	E. H. P. and H. M. R.	H. M. R.	H. M. R.	F. K.	H. W. M.
Instrument.....	7	7	7	7	7	8
Date of first leveling.....	Mar. 5, 1906	June 28, 1906	Oct. 17, 1906*	May 31, 1907	Mar. 26, 1908	Apr. 13, 1908
Date of last leveling.....	June 7, 1906	Oct. 2, 1906	May 20, 1907	Sept. 10, 1907	July 18, 1908	July 18, 1908
Length of main line, kilometers.....	375	427	456	409	404	324
Length of side line, kilometers.....	7	12	32	3	1	13
Total length, kilometers.....	382	439	488	412	405	337
Total length, miles.....	237	273	303	256	252	209
Number of permanent bench marks.....	128	133	125	108	113	93
Average distance between permanent bench marks, in kilometers.....	3.0	3.3	3.9	3.8	3.6	3.6
Progress, kilometers per month.....	124	136	70	124	108	105
Progress, miles per month.....	78	85	43	77	67	65
Percentage run more than twice.....	15	18	26	16	21	28
Discrepancy (B–F), total millimeters.....	–32.3	–87.6	–15.2	+50.4	–122.7	+32.1
Discrepancy (B–F), millimeters per kilometer.....	–0.09	–0.21	–0.03	+0.12	–0.30	+0.10
Probable error for 1 kilometer, in millimeters.....	± 0.9	± 0.9	± 1.0	± 1.0	± 0.8	± 0.9
Velocipede cars used.....	Yes.†	Yes.	No.	No.	Yes.	Yes.

* Leveling was interrupted for 5 days while party was moving from Salt Lake City to Barstow.

† About one-half the time.

Line.	Crawford, Nebr., to Cadiz, Wyo.	Huntley, Mont., to Cadiz, Wyo.	Goffs, Cal., to Albuquerque, N. Mex.	El Reno, Okla., to Jericho, Tex.	Fort Worth to El Paso, Tex.	Jericho, Tex., to Isleta, N. Mex.
Observer.....	F. K.	H. W. M.	H. W. M.	F. K.	H. D. K. and C. M. C.	C. M. C.
Instrument.....	7	8	8	7 and 6	■	10
Date of first leveling.....	July 29, 1908	Aug. 20, 1908	Apr. 16, 1909	July 1, 1909	Apr. 4, 1910	June 5, 1911
Date of last leveling.....	Nov. 5, 1908	Nov. 6, 1908	Dec. 3, 1909	Sept. 14, 1909	Jan. 10, 1911	Nov. 6, 1911
Length of main line, kilometers.....	377	291	982	324	995	870
Length of side lines, kilometers.....	5	■	2	4	18	7
Total length, kilometers.....	382	294	984	328	1013	877
Total length, miles.....	237	183	611	204	629	421
Number of permanent bench marks.....	105	77	258	84	273	111
Average distance between permanent bench marks, in kilometers.....	3.6	3.8	3.8	3.9	3.7	4.1
Progress, kilometers per month.....	119	114	136	133	110	133
Progress, miles per month.....	74	71	85	83	■	83
Percentage run more than twice.....	14	19	23	16	21	7
Discrepancy (B-F), total millimeters.....	-24.8	-15.3	+60.8	-12.4	-72.1	+96.8
Discrepancy (B-F), millimeters per kilometer.....	-0.07	-0.05	+0.06	-0.04	-0.07	+0.14
Probable error for 1 kilometer, in millimeters.....	± 0.7	± 0.9	± 0.9	± 0.8	± 0.8	± 0.7
Velocipede cars used.....	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.

RATE OF PROGRESS ON RECENT PRECISE LEVELING.

On pages 390 and 391 of Appendix 3, Coast and Geodetic Report for 1903, and on pages 15 and 16, "Precise Leveling in the United States, 1903-1907," there are given data regarding the average rates of progress per month for the several leveling parties, the average monthly rate for all the work done with the new level, and there were also instanced a number of cases of unusually rapid leveling.

In the second publication mentioned above the statement is made that the average rate of progress for a leveling party had been 65 miles (104 kilometers) of completed line per month and that the average rate of progress for a whole line varied from 47 to 98 miles per month. Every mile of progress represents a mile leveled at least twice, once in the forward and once in the backward direction. The above average was obtained by using the total number of months of leveling and the total number of miles. If the unit had been the season the mean rate of progress per month for the 16 seasons considered would have been 66.4 miles (106.9 kilometers). The maximum rate of progress for a season is 95 miles (153 kilometers) per month.

There have been added by the Coast and Geodetic Survey to the level net of 1907, 12 seasons of leveling with rates of progress varying from 56 to 84 miles per month. The average rate of progress for all of the 12 seasons (giving each season unit weight) has been 73.6 miles of completed line per month.

The average monthly rate of progress for the 28 seasons' leveling run by the Coast and Geodetic Survey with the new type of instrument is 69.5 miles.

During 6* of the 28 seasons the average monthly rate of progress has been more than 80 miles. These were the following:

In 1902, leveling between Anthony, Kans., and Shreveport, La., 641 miles, rate 85 miles per month. W. H. Burger, chief of party and observer.

In 1905, leveling between Watertown, S. Dak., and Sioux City, Iowa, 237 miles. Rate 95 miles per month. J. B. Miller, chief of party and observer.

In 1905-6, leveling between Smithville and Galveston, Tex., 171 miles. Rate 81 miles per month. E. H. Pagenhart, chief of party and observer.

In 1909, leveling between El Reno, Okla., and Jericho, Tex., 204 miles. Rate 81 miles per month. Ford Kurtz, chief of party and observer.

In 1909, leveling between Goffs, Cal., and Albuquerque, N. Mex., 610 miles. Rate 82 miles per month. H. W. Maynard, chief of party and observer.

In 1911, leveling between Jericho, Tex., and Isleta, N. Mex., 422 miles. Rate 84 miles per month. C. M. Cade, chief of party and observer.

* After the manuscript for this report was sent to press, two precise leveling parties of this Survey at work in 1913 closed their seasons. Assistant J. H. Peters completed 334 miles of leveling to the northward of Butte, Mont., at the rate of 94 miles per month. The other party, first under Assistant C. M. Cade, then under Assistant G. D. Cowie, completed 341 miles of leveling to the westward of Crookston, Minn., at the rate of 89 miles per month. During the one and two-thirds months, while Mr. Cowie was in charge, a progress of 176 miles was made, at the rate of 105 miles per month.

COST OF RECENT PRECISE LEVELING BY THE COAST AND GEODETIC SURVEY.

The cost per completed mile for the 12 seasons' leveling added to the net since the adjustment in 1909 is shown below:

Years.	Location of season's work.	Cost per mile.
1906	San Diego, to Barstow, Cal.....	\$9.40
1906	Pocatello, Idaho, to Butte, Mont.....	13.30
1906-7	Ogden to Salt Lake City, Utah, and Barstow, Cal., to Las Vegas, Nev.....	13.40
1907	Butte to Huntley, Mont.....	15.80
1908	Las Vegas, Nev., to Zenda, Utah.....	13.10
1908	Salt Lake City to Zenda, Utah.....	16.50
1908	Crawford, Nebr., to Cadiz, Wyo.....	12.80
1908	Huntley, Mont., to Cadiz, Wyo.....	14.00
1909	El Reno, Okla., to Jericho, Tex.....	12.70
1909	Goffs, Cal., to Albuquerque, N. Mex.....	11.90
1910-11	Fort Worth to El Paso, Tex.....	11.70
1911	Jericho, Tex., to Isleta, N. Mex.....	10.30

The average cost per mile for these seasons' leveling is \$12.90. The average cost of the 16 seasons of leveling done with the recent instrument, which were included in the 1907 net adjustment, was \$9.70 per mile. The average cost of the 28 seasons considered in the present net is \$11.10 per mile of progress.

The average cost for the several seasons varies considerably, due to a number of causes. On some lines the party lived at hotels and boarding houses convenient to the work, while on others the members lived in a camp or an especially fitted car, and were forced to go out long distances to the work. Some of the lines were run up steep mountain grades while others were over flat prairies. In an old settled country there will be many masonry structures in which to set bench marks, while in a new or unsettled section bench marks must be especially constructed of stone or cement. The number of permanent bench marks used has some influence on the cost of the work. Differences in both the observing and party management of different chiefs of party produced variations in cost which were large in exceptional cases.

The above figures represent the actual cost of the leveling, including the establishment of the bench marks, with the exception of the cost of the instruments and stationery. It includes the transportation to and from the field paid by the Government and all wages and salaries, including those of the chief of party and recorder. The salary of each member of the permanent field force is charged to the leveling for the whole period during which he was engaged upon work incidental to the leveling, including the time spent in travel to and from the field, the time spent in preparing for the field and in completing field reports and records and computations at the end of the season. One-eleventh has been added to the salary actually paid each officer during the time he was connected with the leveling, to take account of the fact that the Government pays its permanent employees 12 months' salary for 11 months' work, upon an average.

The cost of computing a line of levels at the office is between 40 and 45 cents per kilometer, on an average. This computation does not include the orthometric correction nor any net adjustment.

NEW LINES OF UNITED STATES COAST AND GEODETIC SURVEY LEVELING—DETAILED STATEMENT OF RESULTS.

SAN DIEGO TO BARSTOW, CAL.

This line was run by E. H. Pagenhart, Aid, between March 5, 1906, and June 7, 1906. The leveling started from seven tidal bench marks at San Diego, Cal., and followed the line of the Atchison, Topeka & Santa Fe Railway to Barstow, Cal.

Precise level No. 7 and rods R₂ and S were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards, were:

Date.	Rod R ₂ .	Rod S.
	Meters.	Meters.
January, 1905.....	3.0009	3.0014
August, 1906.....	3.0017	3.0020

These measures show a slight lengthening of the rods. The interval between the office measurements of the rods is much longer than usual, due to the rods having been in use practically all the time. The field measurements of the rods during this period show nothing in regard to the time when the above change took place. It was assumed therefore that the lengthening was uniform and the mean length of the rods on April 20, 1906, 3.0014 meters, or an excess of 0.47 millimeter per meter was used in the computation. The index correction of rod R₂ was -0.6 millimeter; of rod S -0.9 millimeter.

Determination of mean sea level.

The results of the tide observations at San Diego are as follows:

	Feet.
1906.....	6.5026
1907.....	6.5574
1908.....	6.4612
Mean.....	6.5071±0.0188

The first series of readings is for 365 days beginning January 21, 1906, and each of the other series is a calendar year in length.

The direct results of the leveling are shown in the following tables, in which all the permanent bench marks are given.

If no distance is given in the fourth column, the bench mark is in the main line of levels. If a distance is given in the fourth as well as in the third column, the bench mark is on a spur and the distance in the fourth column shows the point at which the spur branches from the main line.

The elevations are based on an elevation of 3.49 feet = 1.0638 meters for the 10-foot mark on the tide staff at San Diego.

Results of leveling, San Diego to Barstow, Cal., 1906.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
San Diego.....	Tide Staff.....	0.0			1.0638	Near Don.....	165 S. B.....	92.3	92.1	+ 2.4	50.5010
Do.....	Tidal 7.....	0.1		+ 0.8	0.5972	San Onofre.....	28 S. B.....	100.5		+11.0	8.7382
Do.....	Tidal 6.....	0.2		+ 0.8	2.6079	Do.....	V.....	101.1		+ 8.1	3.0407
Do.....	Tidal 3.....	0.2		+ 0.4	1.8797	Near San Onofre.....	W.....	108.6		+14.2	4.6080
Do.....	Tidal 2.....	0.3		- 0.3	3.0744	Near Mateo.....	X.....	116.0		+24.9	12.5745
Do.....	Tidal 5.....	0.3		- 0.3	2.3716	Near Serra.....					
Do.....	Tidal 4.....	0.4		0.0	3.8061	San Juan Capis- trano.....	103 S. B.....	119.0		+25.8	31.6775
Do.....	Tidal 1.....	0.5		- 0.1	2.6584	Do.....	Y.....	119.3		+25.0	56.1115
Roseville.....	35 Sea.....	2.7		+ 0.3	10.7588	Do.....	Z.....	119.8		+22.1	35.2811
Near Roseville.....	A.....	4.8		+ 0.5	10.1565	Near El Toro.....	A ₁	127.3		+20.5	85.3434
Near San Diego.....	B.....	9.5	7.5	- 2.4	6.2862	Do.....	278 S. B.....	127.4	127.3	+20.2	85.0752
San Diego.....	C.....	11.2	7.5	0.0	7.1818	El Toro.....	444 S. B.....	134.2		+15.8	135.0662
Do.....	42 S. D.....	12.5	7.5	- 2.9	12.9009	Near Irvine.....	B ₁	140.4		+11.7	78.6695
Do.....	City.....	12.8	7.5	- 2.9	14.0584	Irvine.....	C ₁	142.8		+10.6	59.1100
Old Town.....	D.....	8.2		- 5.0	7.7510	Near Aliso.....	D ₁	150.9		- 2.5	24.7690
American Park.....	25 S. D.....	14.7		-10.2	7.7525	Santa Ana.....	E ₁	152.6		- 4.9	32.2083
Near Atwood.....	E.....	15.9		- 6.9	19.1865	Do.....	F ₁	154.3		- 3.9	37.4851
Near Ladrillo.....	F.....	19.0		-11.0	29.5797	Do.....	City.....	155.1		- 3.5	39.0248
Selwyn.....	G.....	24.5		0.0	70.8506	Do.....	G ₁	155.9		- 1.9	37.8424
Linda Vista.....	376 S. D.....	27.0		- 2.1	114.8304	Do.....	H ₁	156.3		- 2.3	40.6439
Sorrento.....	31 S. D.....	33.3		- 6.6	9.6358	Orange.....	I ₁	161.9		+ 7.2	67.0100
Do.....	H.....	33.4		- 7.3	12.3218	Do.....	J ₁	162.4		+ 5.6	60.2026
Near Del Mar.....	I.....	39.3		- 9.8	46.3322	Near Orange.....	K ₁	164.8		+ 5.1	87.4400
Del Mar.....	J.....	40.8		- 9.8	27.5968	Olive.....	L ₁	168.3		+ 1.3	83.5734
Near Encinitas.....	K.....	49.3		- 4.2	22.1713	Near Olive.....	M ₁	169.5		+ 1.3	73.4947
Encinitas.....	L.....	51.8		+ 0.6	28.0264	Richfield.....	N ₁	172.0		+ 1.3	75.0688
Near Carlsbad.....	M.....	65.0		- 2.5	13.4600	Near Yorba.....	R.R.....	175.9		- 0.3	88.4993
Carlsbad.....	N.....	66.2		- 3.0	16.9133	Horse Shoe Bend.....	O ₁	180.6		+ 0.5	116.3774
Oceanside.....	O.....	71.2		- 4.4	13.5404	Near Gypsum.....	P ₁	183.7		+ 2.4	122.5163
Do.....	P.....	71.7		- 3.7	55.3439	Near Crary.....	Q ₁	192.2		+12.4	143.2570
Do.....	Q.....	72.0		- 3.1	20.6144	Do.....	494 S. B.....	194.1		+15.3	150.7553
Do.....	R.....	72.1		- 1.6	19.6423	Near Crary.....	R ₁	195.3		+13.6	154.5842
Near Las Flores.....	S.....	83.1		+ 3.8	22.8474	Corona.....	S ₁	200.4		+10.4	184.8038
Do.....	T.....	83.8		+ 0.4	17.7787	Do.....	T ₁	201.2		+11.6	208.9440
Las Flores.....	84 S. B.....	84.4		+ 0.4	25.8322	Do.....	City.....	201.3		+11.6	205.8412
Don.....	U.....	88.4		+ 3.0	41.6809	Riverside.....	U ₁	204.3		+ 0.7	204.0361

* From Tide Staff at San Diego.

† These elevations are superseded by the standard elevations given in this publication, which depend on an adjustment.

Results of leveling, San Diego to Barstow, Cal., 1906—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Riverside.....	687 May.....	208.3		- 0.3	209.6534	Near Summit....	M ₂	286.4		- 0.7	1136.9636
Do.....	V ₁	210.3		+ 4.0	219.5815	Do.....	3462 S. B.....	291.9		- 1.7	1055.5172
Do.....	814 Arlington.....	214.5		- 5.4	248.5107	Near Hesperia....	N ₂	298.8		+ 4.9	995.3828
Do.....	W ₁	215.4		- 2.8	257.9051	Hesperia.....	3190 S. B.....	300.8		+ 3.8	972.5461
Do.....	X ₁	216.9		- 4.5	258.3422	Do.....	O ₁	301.0		+ 5.8	969.2796
Do.....	861 Casa Blanca.....	218.4		- 7.6	262.6771	Near Hesperia....	2856 Hesperia..	308.8		- 0.7	870.8394
Do.....	863 Olivewood.....	221.9		-12.5	263.1845	Near Victorville..	P ₁	311.9		+ 4.1	837.2259
Do.....	Y ₁	225.5		-12.2	258.4770	Victorville.....	2723 S. B.....	313.8		+ 5.2	830.1357
Do.....	851 Riverside.....	226.0		- 9.9	259.5845	Do.....	Q ₂	314.4		+ 3.9	829.2738
Do.....	Z ₁	226.2		-10.3	261.3609	Do.....	R ₁	314.5		+ 2.5	832.3207
Highgrove.....	945 Highgrove.....	232.0		- 3.1	288.2199	Near Victorville..	S ₁	315.5		+ 3.7	824.2829
Colton.....	A ₁	237.6		- 6.6	298.0906	Oro Grande.....	T ₁	322.7		- 7.7	807.0390
San Bernardino..	B ₁	241.0		-12.9	327.6286	Do.....	U ₁	323.2		- 5.9	808.5591
Do.....	1048 S. B.....	244.0	242.7	-13.7	319.5973	Near Oro Grande..	V ₁	327.2		- 4.5	785.0874
Do.....	C ₁	244.3	242.7	-12.2	320.3156	Near Helen.....	W ₁	332.3		- 9.4	768.9131
Do.....	City.....	244.6	242.7	-13.2	318.4861	Do.....	X ₁	335.5		- 8.3	757.3096
Do.....	D ₁	244.2		-10.2	335.2435	Helen.....	Y ₁	340.2		-19.1	740.6139
Near Verdement..	1420 S. B.....	250.4		- 3.6	433.0905	Near Helen.....	Z ₁	342.8		-19.1	740.1976
Do.....	E ₁	251.8		- 2.1	460.5566	Do.....	A ₁	347.7		-27.9	724.2030
Verdement.....	F ₁	255.1		- 7.1	529.0367	Near Cottonwood..	B ₁	351.7		-27.1	710.3327
Devore.....	G ₁	259.1		-12.4	616.3683	Cottonwood.....	C ₁	355.0		-28.9	692.5162
Near Devore.....	2008 S. B.....	259.9	259.1	-11.0	612.4807	Near Cottonwood..	D ₁	358.0		-34.5	688.4489
Keenbrook.....	H ₁	266.0		- 3.1	755.9543	Do.....	E ₁	360.5		-32.1	684.7466
Near Cajon.....	I ₁	268.4		- 7.0	801.9511	Near Todd.....	F ₁	366.6		-33.3	680.1013
Dell.....	2768 S. B.....	270.4		- 5.7	843.8086	Near Barstow.....	G ₁	372.5		-35.4	651.8559
Cajon.....	J ₁	272.9		-12.5	892.1392	Barstow.....	H ₁	374.0		-32.6	640.6592
Near Gish.....	K ₁	276.8		-10.1	994.5890	Do.....	R.R.....	374.3		-34.1	641.9385
Near Cajon.....	3685 S. B.....	281.2		- 2.3	1123.2866	Do.....	I ₁	374.4		-33.3	643.5276
Summit.....	L ₁	283.4		+ 1.7	1165.3856	Do.....	J ₁	374.6		-32.3	648.9277

* From Tide Staff at San Diego.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

POCATELLO, IDAHO, TO BUTTE, MONT.

This line was run between June 26, 1906, and October 2, 1906. E. H. Pagenhart, Aid, began the work and continued in charge until August 1, when the party was turned over to H. M. Roy, Aid, who completed the work. The leveling started from three bench marks in Pocatello, Idaho, and followed the Oregon Short Line Railroad to Butte, Mont.

Precise Level No. 7 was used for the entire line. Rods R₂ and S were used until July 28 and rods V and W for the remainder of the period of leveling. The lengths of rods R₂ and S and their index corrections are given in connection with the line San Diego to Barstow, Cal. (see p. 31). For the lengths of rods V and W and their index corrections, see line Ogden to Salt Lake City, Utah, page 34.

In the computations a mean length of 3.00146 meters, or an excess of 0.49 millimeter per meter, was used for rods R₂ and S and for rods V and W a mean length of 3.00182 meters, or an excess of 0.61 millimeter per meter.

The leveling between the three bench marks recovered at Pocatello, Idaho, showed that they had not been disturbed since their establishment in 1903.

The elevations in the following table depend on an elevation of 1358.2677 meters for bench mark A₃ at Pocatello, Idaho, which in turn depends on the 1907 adjustment of the precise level net.

Results of leveling, Pocatello, Idaho, to Butte, Mont., 1906.

Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crep- ancy (B-F).	Observed ele- vation.†	Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crep- ancy (B-F).	Observed ele- vation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Pocatello, Idaho.....	B ₃				1359.8555	Near Dell, Mont.....	K.....			-90.3	1834.5942
Do.....	A ₁	0.0		0.0	1358.2677	Dell, Mont.....	L.....	249.2		-29.1	1833.3383
Near Pocatello, Idaho.....	L ₆	7.5		-2.7	1361.1993	Do.....	M.....	249.6		-90.3	1830.0255
Near Ross Fork, Idaho.....	M ₆	15.0		-7.2	1361.5134	Near Crab Tree, Mont.....	N.....	256.3		-95.3	1786.2601
Ross Fork, Idaho.....	N ₆	18.7		-2.7	1358.3592	Crab Tree, Mont.....	O.....	259.0	259.0	-97.2	1772.7492
Do.....	O ₆	19.0		-2.7	1358.9012	Near Crab Tree, Mont.....	P.....	266.2		-101.6	1738.7446
Gibson, Idaho.....	P ₆	27.4		-3.6	1360.0463	Red Rock, Mont.....	Q.....	273.0		-102.1	1705.8005
Near Blackfoot, Idaho.....	Q ₆	34.6		-1.6	1365.7693	Do.....	R.....	273.1		-102.4	1704.9617
Do.....	O. S. L. 4.....	37.1		-2.4	1367.8729	Armstead, Mont.....	S.....	279.7		-104.7	1673.7743
Blackfoot, Idaho.....	R ₆	38.8		-6.4	1371.1880	Near Armstead, Mont.....	T.....	283.5		-108.3	1665.0063
Do.....	S ₆	38.8		-6.1	1370.6736	Near Grayling, Mont.....	U.....	285.6		-103.0	1657.7663
Do.....	T ₆	39.1		-5.7	1370.5608	Grayling, Mont.....	V.....	289.2		-104.4	1640.0000
Do.....	U ₆	39.2		-5.2	1371.7785	Near Barratts, Mont.....	W.....	299.2		-106.2	1608.4300
Near Wapello, Idaho.....	V ₆	48.0		-9.8	1382.5362	Do.....	X.....	306.2		-104.4	1578.9610
Wapello, Idaho.....	W ₆	48.6		-10.9	1383.9345	Near Dillon, Mont.....	Y.....	308.2		-106.5	1571.8978
Near Wapello, Idaho.....	X ₆	52.0		-10.7	1389.8146	Dillon, Mont.....	O. S. L. 16.....	313.5		-103.1	1553.2764
Firth, Idaho.....	Y ₆	57.5		-11.4	1390.8146	Do.....	Z or mag- netic station.	314.7		-105.5	1500.1790
Do.....	Z ₆	58.1		-8.4	1392.7443						
Monroe, Idaho.....	A ₇	62.3		-12.1	1403.3645	Do.....	A ₂	315.7		-103.6	1552.6735
Near Monroe, Idaho.....	B ₇	64.6		-7.3	1404.7436	Do.....	B ₂	315.8		-104.6	1550.3374
Shelley, Idaho.....	C ₇	67.3		-6.3	1410.6071	Do.....	City.....	316.0	315.8		1551.376
Do.....	D ₇	67.6		-4.6	1409.8090	Near Bond, Mont.....	C ₂	328.1		-103.0	1540.4300
Near Idaho Falls, Idaho.....	E ₇	74.9		-11.0	1421.6931	Bond, Mont.....	D ₂	328.1		-103.0	1572.9318
Idaho Falls, Idaho.....	O. S. L. 7.....	81.0		-15.2	1433.7267	Near Apex, Mont.....	E ₂	328.2		-104.4	1522.0800
Do.....	F ₇	81.5		-16.7	1435.1363	Apex, Mont.....	F ₂	332.0		-96.7	1653.7608
Do.....	G ₇	81.9		-16.0	1432.3349	Near Glen, Mont.....	G ₂	335.7		-88.7	1513.0183
Do.....	City.....	82.0		-16.0	1433.9621	Glen, Mont.....	H ₂	345.5		-93.4	1522.9679
Do.....	H ₇	82.2		-15.3	1434.6404	Do.....	I ₂	349.1		-93.4	1524.3478
Do.....	O. S. L. 6.....	82.5		-16.4	1432.9877	Near Layon, Mont.....	J ₂	349.3		-92.0	1533.7730
Near Payne, Idaho.....	I ₇	87.7		-10.9	1438.8533	Layon, Mont.....	K ₂	354.3		-91.3	1540.0988
Do.....	J ₇	93.8		-20.6	1446.7699	Browne, Mont.....	L ₂	355.9		-88.5	1544.5486
Near Bassett, Idaho.....	K ₇	101.2		-27.9	1453.0604	Near Melrose, Mont.....	M ₂	361.4		-80.8	1563.3347
Market Lake, Idaho.....	L ₇	109.9		-33.0	1455.1411	Melrose, Mont.....	N ₂	365.4		-76.5	1579.9444
Do.....	M ₇	110.4		-30.1	1455.7031	Do.....	O ₂	365.5		-77.8	1579.1608
Near Market Lake, Idaho.....	N ₇	111.5		-29.9	1456.5684	Near Big Hole, Mont.....	P ₂	372.9		-81.3	1594.8905
Do.....	O ₇	116.9		-38.2	1461.0304	Big Hole, Mont.....	Q ₂	375.4		-83.3	1612.5645
Near Hawgood, Idaho.....	O. S. L. 8.....	122.6	122.1		1468.860	Malden Rock, Mont.....	R ₂	377.3		-80.7	1620.4999
Do.....	F ₇	124.1		-47.2	1475.4864	Near Divide, Mont.....	S ₂	380.8		-87.7	1629.0291
Hawgood, Idaho.....	Q ₇	126.6		-44.3	1468.8290	Divide, Mont.....	T ₂	383.8	383.8	-85.7	1644.3525
Hamer, Idaho.....	R ₇	135.2		-41.2	1463.2393	Woodin, Mont.....	U ₂	390.4		-75.1	1693.9665
Near Camas, Idaho.....	S ₇	140.0		-47.6	1463.5268	Near Woodin, Mont.....	V ₂	391.1		-74.0	1698.3786
Camas, Idaho.....	T ₇	144.1		-49.2	1468.1548	Beaudine's Spur, Mont.....	W ₂	397.9		-81.4	1733.1968
Near Camas, Idaho.....	U ₇	147.9		-53.9	1475.3771	Feely, Mont.....	X ₂	401.1		-84.8	1772.2683
Jones, Idaho.....	V ₇	152.5		-59.6	1492.2044	Near Buxton, Mont.....	Y ₂	405.7		-86.0	1697.8905
Near Jones, Idaho.....	W ₇	155.5		-58.4	1511.4977	Do.....	O. S. L.....	405.8			1696.906
Dubois, Idaho.....	X ₇	163.3		-66.8	1567.4016	Buxton, Mont.....	Z ₂	407.5		-85.1	1682.7488
Do.....	Y ₇	163.4		-67.7	1569.4858	Silver Bow, Mont.....	A ₃	415.9		-80.5	1626.7637
Near High Bridge, Idaho.....	Z ₇	174.2		-63.3	1671.5915	Do.....	5327 Butte.....	416.0	415.9		1627.0293
Do.....	A ₈	175.6		-59.5	1682.7814	Near Butte, Mont.....	5388 Butte.....	420.9		-86.7	1745.8800
High Bridge, Idaho.....	B ₈	177.6		-62.7	1689.7576	Do.....	B ₃	422.8		-88.2	1650.6264
Do.....	O. S. L. 10.....	177.9	177.6		1701.170	Do.....	C ₃	424.6		-87.7	1657.0764
Near Spencer, Idaho.....	C ₈	182.0		-61.3	1779.2906	Do.....	5441 R. H. C.....	425.9		-91.6	1659.5350
Spencer, Idaho.....	D ₈	185.2		-67.2	1792.9956	Butte, Mont.....	D ₃	427.3		-87.6	1674.2159
Do.....	E ₈	185.3		-67.5	1792.2514	Do.....	E ₃	427.8		-89.9	1691.5855
Do.....	O. S. L. 11.....	185.4		-67.9	1793.1553	Do.....	5563 R. H. C.....	428.7		-91.2	1696.7749
Near Spencer, Idaho.....	F ₈	188.0		-67.7	1804.1909	Do.....	5631 R. H. C.....	429.5		-87.6	1717.2764
Do.....	G ₈	191.4		-62.8	1834.4244	Do.....	5712 Butte.....	430.0		-89.4	1741.8989
Near Humphrey, Idaho.....	H ₈	193.2		-59.3	1852.5528	Do.....	5767 R. H. C.....	430.6		-88.8	1758.2839
Humphrey, Idaho.....	I ₈	207.2		-60.2	1979.0939	Do.....	5811 R. H. C.....	431.0		-88.3	1770.1506
Do.....	J ₈	200.8		-58.4	1985.3890	Do.....	5716 R. H. C.....	431.6		-90.0	1742.7540
Near Monida, Mont.....	K ₈	207.7		-57.6	2046.8101	Do.....	5566 R. H. C.....	433.1		-92.2	1697.3407
Monida, Mont.....	A ₉	211.5		-55.6	2071.0615	Do.....	F ₃ 5485 R. H. C.....	434.7		-90.7	1679.1278
Do.....	B ₉	211.6		-54.8	2069.2830	Do.....		435.0		-90.6	1672.8296
Near Monida, Mont.....	C ₉	217.4		-56.8	2030.7028						
Near Williams, Mont.....	D ₉	220.9		-60.6	2023.6270						
Do.....	E ₉	224.5		-71.5	2006.5101						
Do.....	F ₉	225.8		-71.6	1995.1462						
Do.....	G ₉	230.2		-73.3	1953.7909						
Lima, Mont.....	H ₉	235.9		-80.2	1907.0584						
Do.....	O. S. L. 14.....	236.1	235.9		1907.942						
Do.....	I ₉	236.2		-78.9	1906.4635						
Near Dell, Mont.....	J ₉	243.5		-83.7	1852.2675						

* From A₁ at Pocatello.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

‡ Unchecked elevation; spur line was run in one direction only.

§ Unchecked elevation.

OGDEN TO SALT LAKE CITY, UTAH.

This line was run by H. M. Roy, Aid, between October 17 and December 8, 1906. The leveling started from three bench marks at Ogden, Utah, and followed the Oregon Short Line Railroad to Salt Lake City.

Precise Level No. 7 was used. Rods V and W were used the first day of leveling and rods X and Y for the remainder of the period. The lengths of these rods as determined by the Bureau of Standards were as follows:

Date.	Rod V.	Rod W.	Date.	Rod X.	Rod Y.
	<i>Meters.</i>	<i>Meters.</i>		<i>Meters.</i>	<i>Meters.</i>
December, 1905.....	3.0014	3.0021	September, 1906.....	3.0020	3.0022
August, 1907.....	3.0015	3.0023	August, 1907.....	3.0015	3.0016

In the computation the August, 1907, value of 3.0019 meters was used for rods V and W and the September, 1906, value of 3.0021 meters for rods X and Y. The index corrections were as follows: rod V, -0.8 millimeter, rod W, -0.7 millimeter, rod X, +0.2 millimeter, rod Y, +0.1 millimeter.

The leveling between the two bench marks recovered at Ogden, Utah, showed that they had not been disturbed since their establishment.

The elevations in the following table are based on an elevation of 1308.7087 meters for bench mark A at Ogden which in turn depends on the level net adjustment of 1907.

Results of leveling, Ogden to Salt Lake City, Utah, 1906.

Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crepan- cy (B-F).	Observed ele- vation.†	Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crepan- cy (B-F).	Observed ele- vation.†
		<i>km.</i>	<i>km.</i>	<i>mm.</i>	<i>m.</i>			<i>km.</i>	<i>km.</i>	<i>mm.</i>	<i>m.</i>
Near Ogden.....	A.....	0.0		0.0	1308.7087	Near Farmington.....	K ₁	32.2	32.2	-0.6	1294.8609
Ogden.....	C.....	0.9	0.0	+1.4	1310.3558	Do.....	L ₁	34.1		-4.9	1294.3394
Near Evona.....	A ₁	3.9	3.9	+4.9	1320.8820	Farmington.....	M ₁	34.7		-1.5	1297.9457
Near Roy.....	B ₁	7.2		+1.0	1342.2006	Near Farmington.....	N ₁	38.0		-3.6	1286.1725
Do.....	C ₁	9.7	9.7	+0.8	1351.5553	Centerville.....	O ₁	42.3		+4.4	1293.3761
Near Syracuse Junction.....	D ₁	15.7		-1.3	1351.0143	Wood Cross.....	P ₁	45.7		-1.7	1307.7353
Near Syracuse Grove.....	Salt Lake NW. Base	24.0	15.7	-5.3	1288.8003	Simkins.....	Q ₁	48.3		+3.8	1303.9953
Near Syracuse.....	K. S. 8.....	24.8	15.7	-3.8	1291.8816	Stock Yards Junction.....	R ₁	50.6		+0.5	1297.7801
Near Kaysville.....	Salt Lake SE. Base	32.9	15.7	-8.8	1283.2654	Near Salt Lake City.....	S ₁	55.0		-1.2	1286.9194
Near Layton.....	H ₁	19.8	19.8	+1.2	1354.9971	Salt Lake City.....	T ₁	59.0		-0.6	1297.7811
Layton.....	I ₁	23.7		-0.3	1326.9571	Do.....	U ₁	60.0		-3.6	1319.2868
Kaysville.....	J ₁	27.1	27.0	-1.0	1307.9756	Do.....	V ₁	61.3		-1.7	1297.5990
						Do.....	W ₁	62.6		-5.1	1289.4123

* From A at Ogden.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

BARSTOW, CAL., TO LAS VEGAS, NEV.

This line was run by H. M. Roy, Aid, between December 13, 1906, and May 21, 1907. Three bench marks established earlier in the same year in Barstow were recovered. The leveling follows the Atchison, Topeka & Santa Fe Railway from Barstow to Leastalk, Cal., and the San Pedro, Los Angeles & Salt Lake Railroad from Leastalk, Cal., to Las Vegas, Nev.

Precise level No. 7 and rods X and Y were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards, were:

Date.	Rod X.	Rod Y.
	<i>Meters.</i>	<i>Meters.</i>
September, 1906.....	3.0020	3.0022
August, 1907.....	3.0015	3.0016

The field measurements of the rods also show a slight shortening but there is no indication of any sudden change. It is assumed to be uniformly distributed between the first and the last leveling, over a period of 8.5 months, or at a rate of 0.065 millimeter per month. In the computation the mean length of the rods on various dates during the period of leveling was used. The index correction of rod X was 0.0 millimeter and of rod Y -0.1 millimeter.

The differences of elevation between the three bench marks recovered at Barstow agreed with the previous determinations within the limits of the accuracy of the leveling.

The elevations in the following table are based on an elevation of 648.9277 meters for bench mark J, at Barstow as determined by the line San Diego to Barstow.

Results of leveling, Barstow, Cal., to Las Vegas, Nev., 1906-7.

Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crepancy (B-F)†	Observed ele- vation.†	Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crepancy (B-F)†	Observed ele- vation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Barstow, Cal.	J ₂	0.0		0.0	648.9277	Near Fenner, Cal.	G ₂	201.2		+15.6	582.4472
Near Nebo, Cal.	K ₁	5.0		+10.6	629.3256	Fenner, Cal.	H ₁	206.8		+26.0	638.8941
Do.	L ₂	10.4		+19.1	616.6872	Near Plute, Cal.	I ₂	210.7		+23.8	676.3303
Daggett, Cal.	M ₂	15.1		+10.2	611.3408	Plute, Cal.	J ₂	214.0		+23.6	709.7929
Near Daggett, Cal.	N ₁	20.2		+1.1	602.6300	Near Goffs, Cal.	K ₂	218.4		+23.7	753.4647
Minneola, Cal.	O ₂	24.9		+6.3	583.6467	Goffs, Cal.	L ₂	222.3		+24.0	786.6960
Near Minneola, Cal.	P ₁	28.9		+3.4	574.0136	Near Goffs, Cal.	M ₂	222.9		+26.6	783.9579
Newberry, Cal.	Q ₂	34.7		+4.0	557.7046	Near Vontrigger, Cal.	N ₂	230.7		+20.9	800.7943
Near Newberry, Cal.	R ₁	39.7		+10.3	549.5848	Vontrigger, Cal.	O ₂	237.2		+23.7	1026.7825
Troy, Cal.	S ₂	44.6		+6.8	541.3559	Near Blackburn, Cal.	P ₂	239.9		+24.8	1068.3848
Near Troy, Cal.	T ₂	50.2		+6.9	546.4942	Blackburn, Cal.	Q ₂	243.1		+19.1	1130.6389
Hector, Cal.	U ₁	55.4		+4.7	567.6529	Near Ledge, Cal.	R ₂	250.3		+16.2	1244.7605
Near Pishah, Cal.	V ₁	60.3		+7.9	614.5351	Ledge, Cal.	S ₂	257.8		+6.8	1326.1257
Pishah, Cal.	W ₁	64.4		+6.0	655.0063	Near Ledge, Cal.	T ₂	259.3		+9.1	1339.6395
Near Pishah, Cal.	X ₂	68.0		+4.6	660.8916	Purdy, Cal.	U ₂	262.4		+8.0	1378.0002
Lavie, Cal.	Y ₂	71.6		+6.9	661.8752	Near Barnwell, Cal.	V ₂	266.2		+14.7	1444.0677
Near Lavie, Cal.	Z ₁	75.0		+5.1	649.0385	Barnwell, Cal.	W ₂	269.6		+11.8	1463.7693
Arctic, Cal.	A ₁	78.4		+7.9	617.0068	Near Barnwell, Cal.	X ₂	272.8		+6.8	1393.6038
Near Arctic, Cal.	B ₁	81.3		+10.5	587.0684	Vanderbilt, Cal.	Y ₂	277.2		-1.4	1265.9829
Near Ludlow, Cal.	C ₁	84.6		+0.5	555.4308	Near Vanderbilt, Cal.	Z ₂	280.3		-7.2	1183.2340
Ludlow, Cal.	D ₁	86.7		-1.9	540.3580	Leanstalk, Cal.	A ₂	284.0		-7.2	1069.4460
Near Ludlow, Cal.	E ₁	89.1		+0.4	534.2760	Near Leanstalk, Cal.	B ₂	287.7		-7.6	1036.7937
Near Ash Hill, Cal.	F ₁	93.0		+4.1	554.5882	Moore, Cal.	C ₂	291.3		-7.2	1000.8985
Ash Hill, Cal.	G ₁	97.5		+10.4	592.3259	Near Nipton, Cal.	D ₂	296.2		-8.4	957.0015
Near Ash Hill, Cal.	H ₁	100.5		+7.9	561.4786	Nipton, Cal.	E ₂	300.1		-10.1	921.9867
Near Klondike, Cal.	I ₁	101.6		+8.3	447.3884	Near Nipton, Cal.	F ₂	304.0		-10.4	888.6824
Do.	J ₂	103.2		+9.0	526.5860	Lyons, Cal.	G ₂	307.9		-16.3	854.5739
Klondike, Cal.	K ₁	105.0		+13.0	501.8297	Calada, Cal.	H ₂	315.7		-16.8	889.7288
Near Siberia, Cal.	L ₁	109.6		+12.8	440.3216	Roach, Nev.	A ₂	322.8		-1.1	796.2064
Siberia, Cal.	M ₁	113.2		+5.2	389.0204	Borax, Nev.	B ₂	330.9		+2.7	824.9255
Near Siberia, Cal.	N ₁	116.9		+12.5	337.4333	Jean, Nev.	C ₂	338.2		+0.8	873.6292
Nome, Cal.	O ₁	119.2		+11.4	305.6462	Near Jean, Nev.	D ₂	341.9		-0.8	903.1638
Near Nome, Cal.	P ₁	122.2		+11.1	273.0016	Sutor, Nev.	E ₂	345.5		+4.4	924.5957
Bagdad, Cal.	Q ₁	125.1		+9.9	241.0216	Near Erie, Nev.	F ₂	349.3		+9.9	942.2219
Near Bagdad, Cal.	R ₁	131.4		+11.4	222.5543	Erie, Nev.	G ₂	351.3		+15.3	941.6883
Amboy, Cal.	S ₁	137.6		+20.5	186.2600	Near Sloan, Nev.	H ₂	359.5		+7.9	871.5414
Near Bengal, Cal.	T ₁	144.5		+24.4	205.4868	Sloan, Nev.	I ₂	360.6		+6.2	862.1967
Bengal, Cal.	U ₁	148.1		+25.8	216.0383	Near Sloan, Nev.	J ₂	364.1		+5.8	828.2862
Near Cadiz, Cal.	V ₁	154.4		+28.8	206.3871	Bard, Nev.	K ₂	369.1		-6.1	784.7791
Do.	W ₁	158.2		+35.7	231.4429	Near Arden, Nev.	L ₂	372.7		-6.2	758.6713
Cadiz, Cal.	X ₁	160.6		+34.4	249.4960	Do.	M ₂	376.3		-9.0	731.9909
Near Slam, Cal.	Y ₁	166.0		+29.6	291.1761	Do.	2336 B.	378.3		-12.8	711.5799
Slam, Cal.	Z ₁	169.6		+22.9	316.1902	Bracken, Nev.	N ₂	383.6		-13.8	660.6493
Near Danby, Cal.	A ₂	175.2		+17.6	360.6951	Near Bracken, Nev.	2136 B.	384.7		-10.5	650.5533
Danby, Cal.	B ₂	181.0		+14.2	412.0116	Las Vegas, Nev.	O ₂	390.7		-12.7	618.3479
Near Arimo, Cal.	C ₂	185.8		+13.1	448.5790	Do.	2024 B.	391.6		-11.6	606.4379
Arimo, Cal.	D ₂	188.1		+15.7	467.1310	Do.	P ₂	392.0		-10.7	615.3470
Near Arimo, Cal.	E ₂	191.8		+27.1	498.1629	Do.	2033 B.	392.4		-10.1	619.1610
Essex, Cal.	F ₂	195.5		+19.2	526.9931						

* From J₂ at Barstow.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

BUTTE TO HUNTLEY, MONT.

This line was run by H. M. Roy, Aid, between May 31, 1907, and September 10, 1907. The leveling started from several bench marks in Butte, and followed the Northern Pacific Railway to Huntley, Mont.

Precise level No. 7 was used. Rods X and Y were used up to July 4, and rods AA and BB for the remainder of the period of leveling. For the length of rods X and Y see line Barstow, Cal., to Las Vegas, Nev., page 35. The lengths of rods AA and BB as determined by the Bureau of Standards were:

Date.	Rod AA.	Rod BB.
	Meters.	Meters.
June, 1907.	3.0010	3.0016
January, 1908.	3.0008	3.0013

In the computation values interpolated for various dates during the period of leveling were used for the mean length of rods. The index correction for each of the rods X and Y was -0.2 millimeter, and for rods AA and BB it was 0.0 and -0.1 millimeter, respectively.

The leveling between the bench marks established the previous season at Butte, Mont., showed that they had remained undisturbed.

The elevations in the following table are based on an elevation of 1673.2159^* meters for bench mark D₃ at Butte, Mont.:

Results of leveling, Butte to Huntley, Mont., 1907.

Place.	Perma- nent bench mark.	Dis- tance to bench mark.†	Dis- tance to base of spur.†	Total dis- crep- ancy (B-F).	Observed ele- vation.‡	Place.	Perma- nent bench mark.	Dis- tance to bench mark.†	Dis- tance to base of spur.†	Total dis- crep- ancy (B-F).	Observed ele- vation.‡
		km.	km.	mm.	m.			km.	km.	mm.	m.
Butte.....	D ₃	0.0			1673.2159	Near Africa.....	E ₅	206.6		+39.8	1354.7035
Near Butte.....	G ₃	5.3		+13.1	1708.8391	Africa.....	F ₅	208.5		+41.3	1351.7405
Skones.....	H ₃	9.2		+15.2	1791.8298	Mission.....	G ₅	215.0		+50.8	1333.8181
Highview.....	I ₃	16.0		+19.2	1926.6121	Near Elton.....	H ₅	220.2		+48.0	1322.5376
Homestake.....	J ₃	16.7		+18.5	1928.8301	Elton.....	I ₅	224.1		+46.3	1306.6860
Lewis Spur.....	K ₃	19.4		+23.2	1873.8567	Near Springdale.....	J ₅	229.1		+48.7	1296.9776
Near Lewis Spur.....	L ₃	22.5		+26.2	1811.3388	Springdale.....	K ₅	234.0		+56.4	1286.1374
Welch.....	M ₃	26.3		+29.3	1731.7624	Near Springdale.....	L ₅	237.6		+58.6	1276.7216
Near Welch.....	N ₃	30.0		+36.2	1660.4291	Carney.....	M ₅	241.9		+54.9	1264.3594
Spire Rock.....	O ₃	33.8		+35.2	1588.3219	Dehart.....	N ₅	249.6		+44.2	1251.3007
Near Pipestone.....	P ₃	37.1		+33.3	1522.6529	Near Dehart.....	O ₅	253.1		+48.4	1254.8483
Pipestone.....	Q ₃	41.6		+28.8	1431.8870	Bigtimber.....	P ₅	258.2		+42.4	1242.8868
Near Whitehall.....	R ₃	47.0		+28.9	1347.1116	Near Bigtimber.....	Q ₅	262.1		+41.7	1231.5699
Whitehall.....	S ₃	52.6		+31.5	1326.3450	Near Reynolds.....	R ₅	268.5		+52.3	1203.0515
Do.....	T ₃	53.1		+29.8	1328.6636	Near Greycliff.....	S ₅	271.9		+57.7	1196.4159
Near Whitehall.....	U ₃	58.7		+26.9	1312.2916	Greycliff.....	T ₅	275.4		+66.4	1195.7051
Jefferson Island.....	V ₃	64.8		+33.0	1301.4790	Near Patcum.....	U ₅	280.2		+61.5	1174.5329
Near Lime Spur.....	W ₃	68.5		+34.3	1300.2174	Patcum.....	V ₅	283.2		+57.3	1176.6278
Lime Spur.....	X ₃	71.7		+42.7	1292.6830	Near Quebec.....	W ₅	286.4		+59.3	1160.9636
Near Lime Spur.....	Y ₃	75.4		+42.2	1290.4402	Reedpoint.....	X ₅	296.9		+57.9	1139.4453
Near Sappington.....	Z ₃	79.5		+38.6	1283.7100	Near Reedpoint.....	Y ₅	298.9		+61.8	1135.2731
Sappington.....	A ₄	84.1		+37.4	1274.9167	Oneida.....	Z ₅	302.3		+68.8	1128.9427
Near Sappington.....	B ₄	89.6		+43.8	1267.6068	Near Oneida.....	A ₅	305.8		+72.5	1127.5043
Willow Creek.....	C ₄	94.9		+42.8	1264.6002	Merrill.....	B ₅	310.2		+72.6	1116.0807
Near Willow Creek.....	D ₄	98.8		+37.0	1250.1584	Near Merrill.....	C ₅	312.0		+71.6	1114.0496
Near Three Forks.....	E ₄	102.6		+34.7	1243.3446	Wataga.....	D ₅	315.8		+66.4	1105.9019
Three Forks.....	F ₄	106.2		+30.5	1238.0757	Near Wataga.....	E ₅	319.8		+59.0	1098.1547
Do.....	I Three Forks	107.8		+29.5	1236.0693	Columbus.....	F ₅	323.6		+59.3	1095.9733
Old Gallatin City.....	S. B. Gal- latin.	111.8		+31.3	1233.4364	Do.....	G ₅	323.9		+59.7	1091.6523
Near Old Gallatin City.....	G ₄	113.2		+35.1	1229.9266	Near Columbus.....	H ₅	327.7		+58.9	1077.6728
Do.....	Gauge B. M.	114.4		+31.3	1231.1107	Misko.....	I ₅	333.3		+62.1	1079.0200
Near Logan.....	H ₄	118.6		+35.2	1239.6288	Near Rapids.....	J ₅	335.3		+58.8	1067.5114
Logan.....	I ₄	122.3		+32.7	1248.9956	Rapids.....	K ₅	337.2		+56.6	1062.3970
Near Manhattan.....	J ₄	127.7		+46.8	1281.2485	Near Rapids.....	L ₅	341.1		+55.7	1057.9522
Manhattan.....	K ₄	131.0		+51.5	1291.7845	Youngs Point.....	M ₅	345.1		+55.5	1043.5577
Near Manhattan.....	L ₄	134.2		+51.2	1298.3406	Near Park City.....	N ₅	348.9		+55.7	1038.5711
Central Park.....	M ₄	138.2		+46.6	1318.8692	Park City.....	O ₅	352.5		+53.5	1033.8319
Near Belgrade.....	N ₄	142.6		+48.9	1340.2565	Near Park City.....	P ₅	355.9		+55.8	1024.2394
Belgrade.....	O ₄	146.1		+46.6	1356.3042	Near Laurel.....	Q ₅	359.9		+54.2	1017.7491
Near Belgrade.....	P ₄	150.1		+42.9	1368.2063	Laurel.....	R ₅	364.5		+66.4	1003.9535
Storey.....	Q ₄	154.9		+47.8	1401.2226	Near Laurel.....	S ₅	368.4		+58.7	992.9880
Bozeman.....	R ₄	161.1		+47.6	1447.6475	Foster.....	T ₅	373.9		+58.9	982.2577
Near Bozeman.....	S ₄	165.1		+45.3	1472.2511	Near Yegen.....	U ₅	378.6		+61.0	978.1394
Near Gordon.....	T ₄	171.7		+33.0	1547.8522	Yegen.....	V ₅	382.4		+67.7	970.4118
Chestnut.....	U ₄	175.1		+34.1	1600.2672	Near Billings.....	W ₅	385.9		+74.2	960.0309
Near West End.....	V ₄	178.3		+34.8	1651.6448	Billings.....	X ₅	389.0		+72.2	952.0744
West End.....	W ₄	180.2		+34.5	1686.4814	Do.....	Y ₅	389.5		+69.3	952.0485
Muir.....	X ₄	182.5		+31.8	1686.8365	Do.....	Z ₅	390.0		+68.8	952.1418
Near Hoppers.....	Y ₄	185.5		+38.2	1626.7854	Do.....	A ₅	390.5		+69.9	949.9650
Hoppers.....	Z ₄	187.6		+43.9	1584.6586	Near Billings.....	B ₅	393.1		+67.4	946.6458
Near Coal Spur.....	A ₅	192.2		+45.4	1487.8951	Near Lockwood.....	C ₅	397.1		+62.7	947.5728
Do.....	B ₅	197.9		+48.4	1498.2080	Do.....	D ₅	404.2		+57.7	927.5531
Livingston.....	C ₅	202.4		+42.4	1370.6084	Near Huntley.....	U.S.R.S.1.	406.1		+52.7	923.0487
Do.....	D ₅	202.7		+42.2	1369.1779	Do.....	U.S.R.S.2.	407.2		+55.3	922.2959
						Do.....	U.S.R.S.3.	408.8		+50.4	921.5705

* This value for the elevation of bench mark D₃ differs from that given on p. 34 by 1 meter. This is due to the computation not having been corrected for a meter error discovered in the line from Pocatello to Butte.

† From D₃ at Butte.

‡ These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

LAS VEGAS, NEV., TO ZENDA, UTAH.

This line is an extension to the lines San Diego to Barstow and Barstow to Las Vegas. It was run by Ford Kurtz, Aid, between March 26 and July 18, 1908, and followed the line of the San Pedro, Los Angeles & Salt Lake Railroad.

Precise Level No. 7 and rods AA and BB were used. The lengths of these rods, as determined by the Bureau of Standards, were:

Date.	Rod AA.	Rod BB.
Jan. 11, 1908.	Meters. 3.0008	Meters. 3.0013
Feb. 5, 1909.	3.0004	3.0010

These determinations show very little change in the lengths of the rods. In the computation the mean length of January, 1908, 3.00105 meters, or an excess of 0.35 millimeter per meter, was used up to April 30, 1908. Following this date the mean length of February, 1909, 3.0007 meters, or an excess of 0.23 millimeter per meter, was used.

The index correction of rod AA was -0.1 millimeter; of rod BB -0.2 millimeter.

At Las Vegas three bench marks established the previous season were recovered. The result of the leveling between them showed that they had maintained their position.

The elevations in the following table depend upon an elevation of 618.3470 meters for bench mark P at Las Vegas, as determined by the line Barstow to Las Vegas.

Results of leveling, Las Vegas, Nev., to Zenda, Utah, 1908.

Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crepancy (B-F.)	Observed ele- vation.†	Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crepancy (B-F.)	Observed ele- vation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Las Vegas, Nev.	P	0.0		0.0	615.3470	Caliente, Nev.	S ₂	203.0		-42.1	1342.6316
Stewart, Nev.	Q	8.0		-2.6	580.9701	Do.	T ₂	203.5		-40.3	1344.9064
Near Valley, Nev.	R	12.7		+0.3	601.6402	Eccles, Nev.	U ₂	211.8		-34.0	1409.7757
Valley, Nev.	S	13.7		-0.7	612.2765	Near Minto, Nev.	V ₂	216.3		-34.2	1437.4117
Near Valley, Nev.	T	17.9		-10.3	650.7570	Minto, Nev.	W ₂	219.6		-38.2	1466.3594
Dike, Nev.	U	21.4		-7.2	685.6567	Big Springs, Nev.	X ₂	224.7		-38.8	1542.9542
Near Dike, Nev.	V	26.0		-13.4	735.5306	Islen, Nev.	Y ₂	227.7		-40.2	1522.2856
Apex, Nev.	W	28.7		-17.8	754.1468	Barclay, Nev.	Z ₂	234.3		-50.3	1625.4944
Near Apex, Nev.	X	33.1		-8.8	709.2883	Acoma, Nev.	A ₂	242.8		-63.3	1681.9177
Garnet, Nev.	Y	38.0		-11.5	683.4269	Do.	B ₂	243.0		-63.4	1682.9007
Do.	Z		38.0	-11.2	681.9237	Do.	C ₂	243.1		-64.5	1684.3883
Near Dry Lake, Nev.	A ₁	42.3		-18.2	651.6389	Near Acoma, Nev.	D ₂	245.8		-67.1	1709.3977
Dry Lake, Nev.	B ₁	47.1		-13.6	638.1219	Brown, Nev.	E ₂	250.6		-72.0	1761.9708
Do.	C ₁	47.4		-13.5	636.4427	Crestline, Nev.	F ₂	257.6		-82.2	1823.7309
Near Dry Lake, Nev.	D ₁	50.7		-11.5	639.7809	Do.	G ₂	257.7		-82.0	1824.0797
Crystal, Nev.	E ₁	57.0		-17.9	619.7839	Lien, Nev.	H ₂	264.3		-87.1	1769.0888
Ute, Nev.	F ₁	64.8		-23.2	588.9645	Uvada, Utah	A ₃	269.8		-82.3	1723.5438
Byron, Nev.	G ₁	72.0		-24.2	544.1760	Tomas, Utah	B ₃	277.4		-81.4	1683.3681
Near Moapa, Nev.	H ₁	78.3		-21.3	484.3776	Near Modena, Utah	C ₃	279.2		-83.6	1678.9024
Moapa, Nev.	I ₁	80.6		-27.4	508.2970	Modena, Utah	D ₃	283.6		-84.7	1664.8813
Do.	J ₁	80.7		-26.5	507.9042	Do.	E ₃	283.7		-83.2	1667.2949
Do.	K ₁	80.9		-27.9	510.9288	Do.	F ₃	283.8		-84.0	1665.8910
Do.	L ₁	81.5		-29.2	514.0288	Do.	G ₃	284.0		-85.9	1668.5134
Action, Nev.	M ₁	88.6		-29.2	532.9135	Escalante, Utah	H ₃	293.7		-84.5	1616.7290
Guelph, Nev.	N ₁	96.7		-28.0	531.8433	Near Morton, Utah	I ₃	298.4		-91.7	1588.9832
Near Rox, Nev.	O ₁	100.0		-25.6	546.9968	Morton, Utah	J ₃	302.3		-97.2	1577.8741
Rox, Nev.	P ₁	104.5		-26.7	580.4770	Beryl, Utah	K ₃	310.7		-101.1	1570.0552
Do.	Q ₁	104.7		-28.3	589.1902	Do.	L ₃	311.2		-101.3	1570.5587
Hoya, Nev.	R ₁	112.8		-25.3	617.9252	Do.	M ₃	311.2		-101.0	1568.9025
Galt, Nev.	S ₁	120.5		-10.2	684.0933	Sahara, Utah	N ₃	319.1		-116.6	1587.8886
Near Galt, Nev.	T ₁	126.2		-14.7	724.8954	Do.	O ₃	319.2		-115.9	1585.6386
Vigo, Nev.	U ₁	128.8		-10.0	741.8694	Ford, Utah	P ₃	327.1		-118.3	1569.4194
Near Vigo, Nev.	V ₁	129.8		-8.5	747.3248	Lund, Utah	Q ₃	335.1		-120.7	1549.8224
Near Carp, Nev.	W ₁	134.1		-20.5	769.4213	Do.	R ₃	335.2		-121.4	1549.4904
Carp, Nev.	X ₁	137.3		-27.8	789.4447	Do.	S ₃	335.3		-120.9	1548.7986
Do.	Y ₁	137.4		-27.4	788.9397	Do.	5092 R Lund.	335.4		-121.7	1548.9623
Do.	Z ₁	137.9		-29.2	790.8891	Kerr, Utah	T ₃	342.3		-115.2	1549.5209
St. George, Nev.	A ₂	145.7		-27.8	821.5034	Latimer, Utah	U ₃	350.0		-118.1	1546.7284
Leith, Nev.	B ₂	154.5		-25.9	894.0925	Near Nada, Utah	V ₃	355.5		-115.9	1544.3796
Near Leith, Nev.	C ₂	156.2		-25.3	913.6426	Nada, Utah	W ₃	357.0		-120.6	1546.5006
Do.	D ₂	160.3		-16.6	958.5382	Near Thermo, Utah	X ₃	363.5		-120.2	1537.0089
Kyle, Nev.	E ₂	162.2		-17.6	986.1753	Thermo, Utah	Y ₃	367.9		-122.9	1533.5169
Near Kyle, Nev.	F ₂	164.4		-17.5	1001.5992	Do.	Z ₃	368.4		-125.3	1536.1003
Elgin, Nev.	G ₂	170.2		-24.5	1051.7359	Do.	A ₄	368.5		-124.6	1531.7677
Do.	H ₂	170.9		-22.2	1056.6281	Laho, Utah	B ₄	376.1		-130.1	1526.6050
Do.	I ₂	170.9		-23.4	1056.0667	Upton, Utah	C ₄	384.5		-137.1	1518.4577
Boyd, Nev.	J ₂	178.1		-32.6	1150.9186	Near Milford, Utah	D ₄	388.3		-133.9	1515.0429
Near Boyd, Nev.	K ₂	183.2		-27.9	1196.8399	Milford, Utah	E ₄	392.2		-133.3	1513.7774
Stine, Nev.	L ₂	185.9		-30.3	1228.9550	Do.	F ₄	392.3		-134.5	1512.9794
Cana, Nev.	M ₂	187.1		-30.5	1237.7816	Do.	G ₄	392.7		-135.0	1511.4136
Near Stine, Nev.	N ₂	191.1		-39.1	1266.8732	Do.	5084 F.R.R.	393.1		-135.9	1510.9536
Etna, Nev.	O ₂	195.0		-39.9	1299.5302	Opal, Utah	H ₄	399.7		-122.8	1515.0091
Caliente, Nev.	P ₂	201.3		-44.6	1338.0675	Near Zenda, Utah	I ₄	403.8		-122.7	1511.2697
Do.	Q ₂	201.9		-41.5	1341.8657						
Do.	R ₂	202.6		-43.7	1355.2691						

* From P at Las Vegas.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

SALT LAKE CITY TO ZENDA, UTAH.

This line was run by H. W. Maynard, Aid, between April 13 and July 18, 1908. The leveling started from three bench marks in Salt Lake City, and followed the San Pedro, Los Angeles & Salt Lake Railroad to Zenda, where it was connected with the line Las Vegas to Zenda.

Precise level No. 8 and rods X and Y were used. The lengths of these rods were determined by the Bureau of Standards and are as follows:

	Date.	Rod X.	Rod Y.
August, 1907.....		Meters. 3.0015	Meters. 3.0016
February, 1909.....		3.0007	3.0009

These measurements show a shortening of the rods. The field measurements show no indication of a sudden change during the period of leveling. In the computation various values, depending upon the period of time, were used for the mean length of the rods. The index correction of rod X was -0.1 millimeter and of rod Y -0.3 millimeter.

The new determination of the differences of elevations of the three bench marks at Salt Lake City agreed very closely with the previous determinations.

The elevations in the following table are based on an elevation of 1289.4123 meters for bench mark W_1 at Salt Lake City, Utah, as determined by the line Ogden to Salt Lake City.

Results of leveling, Salt Lake City to Zenda, Utah, 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Salt Lake City.....	W_1	0.0		0.0	1289.4123	Eureka.....	G. S. 6394.....	143.0	137.3	+49.5	1948.7096
Do.....	4251 Slak.....	1.4	0.0	+ 2.7	1295.5778	Near Tintic.....	N_3	142.5		+36.2	1744.2038
Do.....	4352 Slak.....	7.5	1.3	-13.1	1326.5747	McIntire.....	O_3	148.0		+34.1	1700.4455
Do.....	X_1	1.8		- 0.3	1287.7906	Near McIntire.....	P_3	153.2		+32.9	1659.3785
Do.....	O.S.L.4222.57	1.8	1.8	- 0.2	1287.9338	Jericho.....	Q_3	158.7		+35.8	1618.0108
Near Buena Vista.....	Y_1	6.6		- 3.9	1288.3744	Near Jericho.....	R_3	161.9		+33.3	1592.1592
Do.....	Z_1	8.5		- 4.8	1287.0858	Do.....	S_3	166.1		+40.1	1564.7500
Do.....	A_2	12.6		- 3.5	1288.2765	Dyer.....	T_3	168.1		+41.0	1548.4550
Near Riter.....	B_2	15.4		+ 4.3	1285.1168	Near Dyer.....	U_3	169.9		+40.5	1535.5986
Near Garfield.....	C_2	18.3		+ 2.5	1286.2352	Champlin.....	V_3	175.5		+42.4	1508.9040
Do.....	D_2	21.7		- 1.0	1287.3814	Near Lynn Junction.....	W_3	184.5		+45.4	1487.1775
Garfield.....	E_2	24.3		+ 4.9	1291.5923	Do.....	X_3	186.1		+44.5	1459.9493
Do.....	F_2	24.9		+ 4.9	1286.8778	Do.....	Y_3	187.2		+40.4	1457.7682
Near Garfield.....	G_2	28.3		+ 6.3	1287.8220	Lynn Junction.....	Z_3	190.3		+39.4	1457.2757
Do.....	H_2	29.9		+ 3.1	1289.9700	Near Lynn Junction.....	A_4	192.7		+41.5	1455.8750
Lake Point.....	I_2	31.4		+ 6.9	1291.7199	Do.....	B_4	195.9		+35.6	1457.6016
Near Lake Point.....	J_2	33.0		+ 4.8	1297.4569	Near Cline.....	C_4	202.4		+26.9	1451.9211
Near Morris.....	K_2	36.2		- 2.3	1323.6397	Do.....	D_4	205.4		+28.8	1448.9898
Morris.....	L_2	37.8		- 4.7	1334.3017	Near Akin.....	E_4	210.7		+32.7	1418.3634
Erda.....	M_2	44.5		-11.2	1381.7928	Akin.....	F_4	216.7		+31.8	1413.2173
Near Erda.....	N_2	48.0		-12.6	1412.1804	Near Oasis.....	G_4	221.8		+34.6	1403.3118
Shields.....	O_2	51.2		-16.8	1438.0246	Oasis.....	U.S.G.S.4592.....	225.3		+32.2	1399.2754
Near Tooele.....	P_2	55.5		-13.8	1471.2924	Do.....	H_4	225.4		+32.2	1400.1389
Do.....	Q_2	58.9		-20.6	1499.8490	Near Oasis.....	I_4	228.4		+30.6	1394.4247
Near Stockton.....	R_2	62.0		-21.6	1522.0827	Van.....	J_4	233.3		+35.8	1392.4612
Stockton.....	S_2	67.1		-21.2	1543.9110	Jerome.....	K_4	239.7		+41.0	1391.3303
Near Stockton.....	T_2	68.7		-20.8	1533.2614	Clear Lake.....	L_4	247.0		+38.8	1394.8003
Do.....	U_2	72.1		-21.8	1515.2529	Near Neels.....	M_4	259.1		+44.7	1417.7638
St. John.....	V_2	77.6		-27.7	1529.3714	Near Borden.....	N_4	265.6		+33.0	1449.6946
Near Ajax.....	W_2	86.5		-22.8	1535.5551	Near Goss.....	O_4	270.2		+34.7	1465.1034
Do.....	X_2	89.7		-20.7	1542.2151	Goss.....	P_4	274.0		+35.7	1450.6367
Faust.....	Y_2	98.3		+ 3.9	1600.1379	Near Goss.....	Q_4	276.9		+35.7	1462.5958
Near Faust.....	Z_2	100.2		+ 9.0	1614.0605	Cruz.....	R_4	281.8		+27.2	1484.3476
Do.....	A_3	103.4		+ 1.3	1645.6540	Near Cruz.....	S_4	283.5		+26.2	1475.6967
Vernon.....	B_3	107.3		+ 4.5	1679.0741	Near Pumice.....	T_4	288.3		+29.1	1472.2713
Near Vernon.....	C_3	108.3		+ 5.9	1685.5984	Pumice.....	U_4	289.7		+28.9	1479.9094
Dunbar.....	D_3	112.0		+12.2	1715.2525	Near Pumice.....	V_4	290.3		+29.8	1477.5934
Near Dunbar.....	E_3	113.5	113.5	+16.0	1727.4491	Black Rock.....	W_4	298.1		+27.9	1478.2021
Near Loggreen.....	F_3	116.9		+19.3	1750.5373	Do.....	X_4	298.1		+27.0	1478.4199
Loggreen.....	G_3	118.9		+18.5	1767.8566	Malone.....	Z_4	305.8		+32.0	1489.4035
Near Boulder.....	H_3	126.1		+28.5	1820.5792	Near Read.....	A_5	309.4		+30.8	1483.9301
Boulder.....	I_3	127.9		+33.3	1835.0935	Read.....	B_5	313.9		+21.6	1487.7854
Near Boulder.....	J_3	130.8		+33.3	1834.1951	Do.....	C_5	314.3		+22.1	1487.5880
Near Tintic.....	K_3	133.9		+38.6	1810.5036	Near Read.....	D_5	317.5		+27.7	1494.3111
Tintic.....	L_3	137.3		+40.3	1784.9783	Zenda.....	E_5	321.3		+29.1	1504.9932
Near Tintic.....	M_3	139.6	137.3	+39.9	1832.7325	Do.....	I_5	323.9		+32.1	1510.0909

* From W_1 at Salt Lake City.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

CRAWFORD, NEBR., TO CADIZ, WYO.

This line was run by Ford Kurtz, Aid, between July 29 and November 5, 1908. Leveling started from two bench marks in Crawford, Nebr., and followed the line of the Chicago, Burlington & Quincy Railroad to Cadiz, Wyo.

Precise Level No. 7 and Rods AA and BB were used. For the lengths of these rods as determined by the Bureau of Standards see line Las Vegas, Nev., to Zenda, Utah, page 37.

In the computation the mean length of the rods on February 5, 1909, 3.0007 meters, or an excess of 0.23 millimeter per meter was used. The index correction to both rods was -0.2 millimeter.

The result of the leveling between the two bench marks recovered at Crawford, Nebr., showed that they had not been disturbed since their establishment in 1902.

The direct results of the leveling are shown in the following table. The elevations are based on an elevation of 1121.5968 meters which is the adjusted elevation published on page 110 of "Precise Leveling in the United States 1903-1907."

Results of leveling, Crawford, Nebr., to Cadiz, Wyo., 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Crawford, Nebr.	G.	0.0		0.0	1121.5968	Pedro, Wyo.	Y.	174.3		-62.8	1282.0314
Fort Robinson, Nebr.	H.	5.0	0.0	-10.8	1153.8640	Near Pedro, Wyo.	4218 DW.	177.9		-59.7	1287.0366
Crawford, Nebr.	N.	0.6		-0.9	1118.7296	Near Osage, Wyo.	Z.	181.8		-64.3	1315.8191
Near Crawford, Nebr.	O.	4.3		-0.1	1129.9363	Do.	4312 DW.	185.1		-61.1	1315.7027
Horn, Nebr.	P.	9.3		-5.5	1122.7182	Jerome, Wyo.	A.	198.1		-65.4	1284.4002
Near Horn, Nebr.	Q.	16.7		-5.5	1135.8888	Do.	B.	198.4		-65.3	1283.9086
Near Joder, Nebr.	R.	18.0		-2.8	1131.6122	Near Jerome, Wyo.	C.	201.7		-62.4	1273.7412
Do.	S.	21.2		+2.4	1129.6844	Near Upton, Wyo.	D.	207.1		-62.5	1288.5440
Joder, Nebr.	T.	23.1		+4.8	1136.9881	Upton, Wyo.	E.	207.7		-61.0	1291.3630
Orella, Nebr.	U.	28.1		+6.9	1167.3131	Do.	F.	208.0		-60.3	1291.3610
Near Orella, Nebr.	V.	31.1		-3.5	1127.6763	Do.	G.	208.3		-59.9	1291.4724
Mansfield, Nebr.	W.	36.8		-6.0	1106.0292	Thornton, Wyo.	H.	220.0		-69.7	1318.5643
Near Ardmore, S. Dak.	N.S.D. 204 M.	42.7		-9.4	1090.1061	Near Kara, Wyo.	I.	226.0		-58.3	1325.3305
Ardmore, S. Dak.	O.	45.2		-7.6	1085.5075	Kara, Wyo.	J.	229.6		-58.7	1326.6820
Do.	3553 DW.	45.5		-8.0	1084.2306	Do.	K.	230.2		-58.2	1325.1220
Near Ardmore, S. Dak.	3527 DW.	49.0		-1.9	1076.2813	Near Kara, Wyo.	L.	230.9		-57.0	1328.0826
Near Rumford, S. Dak.	3487 DW.	53.9		+1.7	1064.1303	Near Moorcroft, Wyo.	M.	233.4		-61.3	1335.0326
Rumford, S. Dak.	3500 DW.	58.8		-1.5	1068.0920	Do.	N.	236.9		-63.1	1306.2329
Near Rumford, S. Dak.	3532 DW.	62.9		-6.2	1077.8766	Moorcroft, Wyo.	O.	241.2		-61.7	1283.0458
Near Provo, S. Dak.	3632 DW.	67.7		-10.6	1108.3445	Do.	P.	241.3		-62.8	1283.0226
Provo, S. Dak.	3708 DW.	72.7		-4.4	1131.5541	Do.	Q.	242.4		-53.2	1280.9756
Near Provo, S. Dak.	P.	77.0		-4.2	1103.8493	Near Moorcroft, Wyo.	R.	244.8		-62.6	1268.0746
Near Dennis, S. Dak.	Q.	79.4		-5.0	1091.8249	Do.	S.	245.9		-62.0	1267.8975
Do.	3528 DW.	82.9		-5.7	1076.6726	Near Wessex, Wyo.	T.	250.9		-55.0	1283.7170
Near Edgemont, S. Dak.	R.	85.2		-7.3	1066.1910	Wessex, Wyo.	U.	254.1		-67.0	1286.4961
Edgemont, S. Dak.	S.	87.6		-8.9	1053.6915	Rozet, Wyo.	V.	263.1		-44.5	1306.3352
Do.	T.	87.7		-10.4	1053.9561	Near Rozet, Wyo.	W.	270.3		-45.1	1329.3219
Do.	3449 DW.	88.1		-10.0	1052.6226	Minturn, Wyo.	X.	276.5		-51.0	1340.9794
Do.	U.	88.7		-8.6	1049.0729	Near Gillette, Wyo.	Y.	280.9		-48.8	1357.0295
Near Edgemont, S. Dak.	3463 DW.	94.8		-22.8	1056.8789	Gillette, Wyo.	Z.	287.6		-48.5	1385.0774
Marietta, S. Dak.	3486 DW.	101.2		-27.4	1063.8763	Do.	A.	287.9		-49.3	1386.8899
Near Marietta, S. Dak.	3544 DW.	105.6		-32.0	1081.6067	Near Gillette, Wyo.	B.	288.2		-50.1	1385.8124
Argentine, S. Dak.	3632 DW.	110.4		-31.0	1108.4070	Sparta, Wyo.	C.	293.2		-53.5	1422.8982
Do.	V.	111.1		-31.8	1104.7350	Griva, Wyo.	D.	296.6		-60.8	1447.7710
Near Dewey, S. Dak.	W.	116.4		-34.8	1125.0207	Do.	E.	303.2		-49.3	1418.4083
Do.	X.	118.5		-34.5	1126.8594	Near Oriva, Wyo.	F.	303.3		-48.6	1415.3907
Dewey, S. Dak.	3704 DW.	119.8		-36.1	1130.1729	Kier, Wyo.	G.	305.6		-48.0	1406.4900
Near Dewey, S. Dak.	S.D. WY 3824 M.	123.0		-41.6	1142.5824	Near Felix, Wyo.	H.	311.6		-50.3	1353.7590
Dakoming, Wyo.	Q.	127.8		-52.1	1169.0664	Felix, Wyo.	I.	316.0		-50.0	1311.9960
Clifton, Wyo.	R.	133.3		-59.1	1203.4223	Do.	J.	318.0		-48.3	1296.0390
Do.	S.	133.4		-57.9	1201.3456	Near Felix, Wyo.	K.	318.6		-46.5	1291.5711
Near Clifton, Wyo.	T.	136.0		-53.9	1215.5858	Echeta, Wyo.	L.	323.2		-45.8	1251.8203
Do.	3971 DW.	137.6		-56.9	1211.5684	Do.	M.	327.7		-39.6	1244.8674
Near Spencer, Wyo.	4120 DW.	147.4		-45.3	1257.0449	Do.	N.	327.8		-38.8	1244.0374
Spencer, Wyo.	4195 DW.	151.0		-45.8	1279.8751	Near Echeta, Wyo.	O.	331.2		-41.5	1218.8000
Johnson Siding, Wyo.	U.	157.1		-46.0	1323.9957	Croton, Wyo.	P.	337.2		-50.5	1205.9905
Near Newcastle, Wyo.	4344 DW.	156.9	155.8	-47.3	1325.4750	Do.	Q.	337.5		-51.3	1208.0370
Do.	V.	160.2		-46.8	1316.4919	Near Lariat, Wyo.	R.	343.6		-49.6	1189.6251
Do.	W.	160.3		-46.8	1318.3586	Lariat, Wyo.	S.	347.7		-48.9	1183.6942
Do.	X.	160.8		-45.3	1330.6509	Arvada, Wyo.	T.	359.1		-29.9	1117.0408
Do.	4332 DW.	161.1		-45.7	1321.8021	Do.	U.	359.5		-29.3	1114.2710
Do.	U.S.G.S.M.M.	161.3		-45.7	1319.6831	Do.	V.	359.6		-30.3	1114.8279
Near Newcastle, Wyo.	4171 DW.	170.0		-59.8	1272.7252	Kendrick, Wyo.	W.	370.9		-26.8	1180.1992
						Cadiz, Wyo.	W.	377.4		-24.8	1138.8698

* From G, at Crawford.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

HUNTLEY, MONT., TO CADIZ, WYO.

This line was run by H. W. Maynard, Aid, between August 20 and November 6, 1908. The leveling started from two bench marks in Huntley, Mont., and followed the line of the Chicago, Burlington & Quincy Railroad to Cadiz, Wyo. Precise Level No. 8 and rods X and Y were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards, are shown on page 39, in connection with the line Salt Lake City to Zenda, Utah.

In the computation the mean length of the rods interpolated for various dates during the period of leveling was used. The index corrections were the same as given on page 39 in connection with the line Salt Lake City to Zenda, Utah.

The result of the leveling between the two bench marks recovered at Huntley, Mont., differed very little from that of the previous year.

The elevations in the following table depend on an elevation of 921.5705 meters for U. S. R. S. 3, as determined by the line Butte to Huntley.

Results of leveling, Huntley, Mont., to Cadiz, Wyo., 1908.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation. †
		km.	km.	mm.	m.			km.	km.	mm.	m.
Near Huntley, Mont..	U. S. R. S. 3..	0.0	.....	0.0	921.5705	Near Lodge grass, Mont.	Y ₇	127.0	.....	-10.7	1018.9115
Huntley, Mont.	U. S. R. S. 4..	1.3	.....	+ 1.1	920.3727	Lodgegrass, Mont....	Z ₇	129.6	.....	- 4.3	1023.4653
Near Huntley, Mont..	U. S. R. S. 5..	3.1	.....	+ 3.7	918.6257	Near Lodgegrass, Mont.	A ₈	130.3	.....	- 5.0	1025.7441
Do.....	U. S. R. S. 6..	4.5	.....	+ 6.1	917.3688	Near Little Horn, Mont.	B ₈	139.1	.....	-14.4	1065.9695
Do.....	U. S. R. S. 7..	5.4	.....	+ 5.5	916.4649	Near Wyola, Mont....	C ₈	145.1	.....	-11.2	1095.3111
Do.....	U. S. R. S. 8..	7.6	.....	+ 4.0	918.4841	Wyola, Mont.....	D ₈	151.0	.....	-10.9	1130.3179
Near Ballantine, Mont.	U. S. R. S. 9..	9.9	.....	+ 5.7	916.5700	Do.....	E ₈	151.2	.....	-11.3	1128.0659
Do.....	U. S. R. S. 10.	11.4	.....	+ 4.4	917.0662	Near Aberdeen, Mont.	F ₈	158.9	.....	- 2.0	1185.4298
Do.....	U. S. R. S. 11.	12.7	.....	+ 1.9	914.0400	Aberdeen, Mont....	G ₈	164.0	163.0	.....	1203.8771
Do.....	E ₇	14.7	.....	- 2.5	908.1956	Near Parkman, Wyo.	H ₈	166.2	.....	+ 1.3	1245.1977
Ballantine, Mont....	U. S. G. S. 2982	16.3	.....	- 4.9	913.1962	Parkman, Wyo.....	U. S. G. S. 4292.	172.0	.....	- 9.0	1309.8087
Near Ballantine, Mont.	U. S. R. S. 12.	16.7	.....	- 4.1	914.8407	Ohlman, Wyo.....	U. S. G. S. 4138.	176.5	176.3	- 2.7	1262.8644
Do.....	U. S. R. S. 13.	18.8	.....	- 1.6	924.7259	Near Ranchester, Wyo.	U. S. G. S. 4011.	179.8	.....	- 9.5	1222.2909
Do.....	U. S. R. S. 14.	20.1	.....	+ 0.4	923.3812	Ranchester, Wyo....	U. S. G. S. 3788..	186.2	.....	-18.3	1154.2462
Do.....	U. S. R. S. 15.	21.8	.....	+ 2.9	922.3258	Do.....	S. E. Base	186.3	.....	-18.9	1154.2701
Near Anita, Mont....	U. S. R. S. 16.	23.4	.....	+ 6.0	923.3400	Do.....	U. S. G. S. 3751.	187.3	.....	-21.4	1144.7236
Anita, Mont.....	U. S. G. S. 3056	26.6	.....	+ 2.1	929.3441	Near Ranchester, Wyo.	U. S. G. S. 3698.	192.0	.....	-17.5	1128.7475
Near Anita, Mont....	F ₇	30.3	.....	+ 4.5	921.6781	Do.....	U. S. G. S. 3660.	196.5	.....	-20.0	1117.0650
Do.....	G ₇	31.7	.....	+ 8.2	919.4669	Do.....	Z ₈	198.3	.....	-20.4	1117.2265
Corinth, Mont.....	U. S. G. S. 3144	37.4	.....	+11.9	939.1220	Alger, Wyo.....	A ₄	200.5	200.5	-18.9	1106.3399
Toluca, Mont.....	U. S. G. S. 3303	53.0	.....	+18.7	987.8194	Near Dietz, Wyo....	B ₄	204.1	.....	-17.7	1103.3800
Near Toluca, Mont..	H ₇	58.4	.....	+11.5	952.0478	Near Sheridan, Wyo.	U. S. G. S. 3682.	211.9	.....	-25.4	1123.9141
Do.....	I ₇	61.6	.....	+ 7.9	942.8107	Do.....	C ₄	213.0	.....	-23.8	1131.7033
Near Hardin, Mont..	J ₇	71.0	.....	+ 8.5	895.9655	Sheridan, Wyo.....	Astro.....	215.3	.....	-23.8	1136.7793
Do.....	U. S. G. S. 2989	71.8	.....	+10.4	891.5741	Do.....	D ₄	216.5	215.3	-26.3	1140.0957
Hardin, Mont.....	K ₇	75.3	.....	+10.4	883.4645	Do.....	U. S. G. S. 3738.	216.7	215.3	-22.6	1140.8569
Near Hardin, Mont..	L ₇	78.0	.....	+17.1	881.6765	Do.....	E ₄	217.0	215.3	-23.8	1143.2407
Do.....	M ₇	78.2	.....	+16.5	881.6950	Wakeley, Wyo.....	F ₄	223.4	.....	-28.5	1141.9954
Do.....	N ₇	78.7	.....	+15.4	881.1980	Arno, Wyo.....	G ₄	233.4	.....	-34.9	1149.4357
Dunmore, Mont....	O ₇	86.9	.....	- 0.4	902.3030	Near Verona, Wyo..	H ₄	240.4	.....	-23.0	1172.1658
Near Dunmore, Mont.	P ₇	87.8	.....	- 4.4	907.3462	Verona, Wyo.....	I ₄	245.8	.....	-19.8	1221.3301
Do.....	Q ₇	91.6	.....	- 4.4	916.0541	Ulm, Wyo.....	J ₄	258.7	.....	-15.5	1352.6875
Crow Agency, Mont.	R ₇	96.1	.....	- 9.4	924.3267	Near Ulm, Wyo....	K ₄	263.0	.....	-13.6	1299.9859
Near Crow Agency, Mont.	S ₇	96.6	.....	-12.0	925.0113	Near Clearmont, Wyo.	L ₄	271.7	.....	-16.6	1216.0955
Do.....	T ₇	99.8	.....	-16.6	931.1647	Clearmont, Wyo....	M ₄	276.9	.....	- 9.7	1193.4001
Garryowen, Mont..	U ₇	104.9	.....	-18.2	950.0550	Do.....	N ₄	277.2	.....	- 7.4	1193.6291
Near Garryowen, Mont.	V ₇	109.4	.....	- 7.0	961.0528	Big Corral, Wyo....	O ₄	287.6	.....	-11.3	1156.9130
Near Ionia, Mont....	W ₇	118.9	.....	- 2.5	988.0816	Cadiz, Wyo.....	W ₈	290.9	.....	-15.3	1136.6874
Ionia, Mont.....	X ₇	122.5	.....	- 1.8	997.2459						

* From U. S. R. S. 3 near Huntley.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

GOFFS, CAL., TO ALBUQUERQUE, N. MEX.

This line was run by H. W. Maynard, Aid, between April 16 and December 3, 1909. The leveling started from two bench marks in Goffs and followed the line of the Atchison, Topeka & Santa Fe Railway to Albuquerque, N. Mex. Precise level No. 8 and rods X and Y were used. The lengths of these rods at 0° C., as determined by the Bureau of Standards and the Instrument Division of this Survey, were:

Date.	Rod X.	Rod Y.
	Meters.	Meters.
February 5, 1909.....	3.0007	3.0009
January 22, 1910.....	3.0003	3.0005

In accordance with paragraph 21 of the general instructions, each rod was measured with a steel tape at least twice a month while in the field. The field measurements of the rods confirm the shortening found by the Instrument Division and show that it was distributed uniformly over the entire period of leveling. The mean length of rods interpolated for various dates during the period of leveling was used in the computation. The index correction of rod X was -0.2 millimeter and rod Y -0.4 millimeter.

The difference of elevation between the bench marks recovered at Goffs determined by this leveling agreed with the former difference within the limits of the accuracy of the leveling.

The elevations in the following table depend upon an elevation of 786.6405 meters for L_5 at Goffs.

Results of leveling, Goffs, Cal., to Albuquerque, N. Mex., 1909.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Goffs, Cal.	L_5	0.0		0.0	786.6405	Near Peach Springs, Ariz.	S_1	226.0		- 6.7	1404.8950
Rising, Cal.	I_5	5.8		- 9.9	735.2199	Peach Springs, Ariz.	T_1	231.3		- 3.5	1459.1953
Near Homer, Cal.	J_5	14.9		-16.7	610.2255	Nelson, Ariz.	U_1	242.1		+ 0.7	1559.2607
Ibis, Cal.	K_5	27.1		- 8.6	442.9545	Near Nelson, Ariz.	V_1	243.9		+ 2.0	1590.4027
Near Java, Cal.	L_5	34.3		-18.0	347.6388	Near Yampai, Ariz.	W_1	250.4		- 3.9	1662.1423
Do.	M_5	38.2		-19.0	299.0128	Yampai, Ariz.	X_1	253.8		-11.4	1701.7929
Hartoum, Cal.	N_5	44.1		-17.0	225.4581	Near Yampai, Ariz.	Y_1	258.4		-17.6	1644.6904
Needles, Cal.	O_5	50.2		-19.6	146.9480	Near Pica, Ariz.	Z_1	265.1		-20.8	1587.8315
Do.	P_5	50.2		-19.9	147.4070	Do.	A_2	268.1		-18.3	1581.7017
Do.	Q_5	50.4		-20.5	148.5500	Near Audley, Ariz.	B_2	271.4		-17.2	1577.9476
Do.	Needles Astro.	50.9	50.6	-19.0	153.3019	Audley, Ariz.	C_2	274.5		-20.3	1570.3515
Do.	R_5	51.4	50.6	-18.6	168.1928	Near Audley, Ariz.	D_2	277.9		-21.8	1568.0521
Near Needles, Cal.	S_5	58.2		-19.3	144.8652	Near Chino, Ariz.	E_2	282.6		-16.3	1612.4952
Do.	U. S. G. S. 473.	58.5		-19.6	144.3038	Do.	F_2	285.7		-19.3	1619.4165
Near Boal, Cal.	T_5	58.5		-20.0	142.7230	Near Seligman, Ariz.	G_2	289.0		-20.3	1593.9135
Do.	U_5	64.8		-23.7	140.8788	Do.	H_2	289.2		-19.6	1592.5761
Do.	V_5	68.1		-27.1	144.5169	Seligman, Ariz.	I_2	291.0		-19.3	1597.4117
Topock, Ariz.	U. S. G. S. 504.	69.6		-27.9	153.6839	Near Pan, Ariz.	J_2	298.5		-16.1	1665.7989
Do.	Δ Topog.	69.7		-28.3	153.8441	Near Crookton, Ariz.	K_2	309.9		-14.7	1710.8224
Near Topock, Ariz.	A_2	69.8		-28.2	153.6597	Glead, Ariz.	L_2	314.3		-12.7	1654.1040
Do.	B_2	73.6		-31.5	161.4411	Near Pineveta, Ariz.	M_2	318.8		-16.7	1557.0321
Near Powell, Ariz.	C_2	74.6		-34.9	171.7910	Do.	N_2	322.0		- 9.3	1534.3079
Near Powell, Ariz.	D_2	79.3		-40.6	214.3575	Near Ash Fork, Ariz.	O_2	327.3		- 9.3	1535.9630
Powell, Ariz.	U. S. G. S. 762.	81.0		-37.6	232.2382	Ash Fork, Ariz.	U. S. G. S. 5141.	332.7		+ 1.8	1596.3260
Franconia, Ariz.	U. S. G. S. 1101.	91.0		-38.7	335.3551	Do.	P_2	333.2	332.7	+ 3.6	1599.2115
Near Franconia, Ariz.	E_2	94.6		-35.7	390.7181	Near Ash Fork, Ariz.	U. S. G. S. 5134.	335.5		+ 4.4	1564.2529
Do.	F_2	95.1		-35.9	386.0038	Near Holmes, Ariz.	U. S. G. S. 5446.	339.3		+10.0	1659.2677
Do.	G_2	95.4		-37.6	386.0030	Do.	Q_2	340.9		+ 4.6	1688.0800
Do.	H_2	95.9		-38.4	390.8998	Near Fairview, Ariz.	U. S. G. S. 5713.	344.1		+ 8.0	1740.7660
Near Haviland, Ariz.	I_2	97.2		-40.9	405.4046	Fairview, Ariz.	U. S. G. S. 5964.	348.7		+12.6	1909.0283
Do.	J_2	103.2		-41.6	457.9922	Near Fairview, Ariz.	R_2	349.7		+11.2	1823.8945
Do.	K_2	104.1		-39.5	467.1892	Do.	S_2	350.7		+13.2	1847.1231
Do.	L_2	105.5		-40.3	486.1307	Do.	T_2	352.3		+13.2	1885.5203
Near Yucca, Ariz.	M_2	106.8		-40.9	501.7408	Near McLellan, Ariz.	U_2	353.9		+16.2	1922.4393
Do.	N_2	108.4		-44.1	515.7420	McLellan, Ariz.	V_2	356.3		+24.6	1957.7903
Do.	O_2	109.7		-45.0	531.9762	Near McLellan, Ariz.	U. S. G. S. 6568.	358.6		+26.2	2001.3890
Yucca, Ariz.	P_2	111.4		-41.2	550.7005	Near Supai, Ariz.	W_2	363.1		+22.4	2104.3635
Near Yucca, Ariz.	Q_2	111.8		-39.0	555.6982	Supai, Ariz.	U. S. G. S. 6961.	364.1		+22.3	2121.2235
Do.	R_2	114.5		-43.6	589.2442	Near Williams, Ariz.	X_2	368.6		+24.7	2067.0745
Near Kaster, Ariz.	S_2	123.9		-37.3	694.5633	Williams, Ariz.	U. S. G. S. 6770.	369.8		+24.9	2062.2532
Near Drake, Ariz.	T_2	130.0		-36.2	766.9118	Do.	Y_2	370.1		+25.3	2062.4575
Drake, Ariz.	U_2	132.2		-37.0	794.9691	Near Williams, Ariz.	Z_2	374.1		+27.9	2105.2097
Near Drake, Ariz.	V_2	134.0		-37.5	806.4379	Do.	U. S. G. S. 6952.	375.4		+33.4	2118.3779
Do.	W_2	136.1		-40.7	822.6550	Do.	U. S. G. S. 6930.	376.5		+35.0	2111.7537
Hancock, Ariz.	X_2	137.2		-43.6	838.6614	Near Davern, Ariz.	U. S. G. S. 6953.	380.5		+33.7	2118.8457
Near McConico, Ariz.	Y_2	141.3		-41.0	883.5326	Chalender, Ariz.	U. S. G. S. 6869.	386.6		+35.1	2092.9984
Near Kingman, Ariz.	Z_2	147.4		-42.9	984.1337	Near Chalender, Ariz.	A_3	387.8		+37.7	2091.4966
Kingman, Ariz.	A_3	149.5		-49.5	1018.1178	Do.	U. S. G. S. 6852.	389.8		+38.2	2087.5023
Do.	B_3	149.6		-48.3	1014.8168	Near Maine, Ariz.	B_3	393.8		+32.6	2134.0654
Berry, Ariz.	C_3	160.2		-45.9	1028.6421	Maine, Ariz.	U. S. G. S. 7086.	395.5		+25.9	2159.3314
Near Hualapai, Ariz.	D_3	171.1		-40.9	995.3662	Near Maine, Ariz.	U. S. G. S. 7178.	398.9		+24.1	2187.1617
Hualapai, Ariz.	E_3	173.7		-45.9	1005.4307	Near Arny, Ariz.	U. S. G. S. 7193.	402.9		+14.4	2191.9341
Do.	F_3	174.6		-46.1	1011.7919	Near Bellemont, Ariz.	U. S. G. S. 7131.	406.1		+14.5	2172.9411
Near Hualapai, Ariz.	G_3	176.1		-42.8	1022.1777	Do.	C_4	407.8		+13.2	2173.3345
Do.	H_3	177.9		-38.5	1042.2299	Do.	U. S. G. S. 7186.	410.9		+15.0	2189.6877
Antares, Ariz.	I_3	184.2		-33.5	1098.8394	Near Riordan, Ariz.	U. S. G. S. 7273.	415.7		+13.1	2216.3541
Near Hackberry, Ariz.	J_3	191.1		-35.3	1083.5886	Near Agassiz, Ariz.	U. S. G. S. 7091.	420.5		+13.5	2160.6145
Do.	K_3	193.4		-31.8	1080.1363	Do.	D_5	421.2		+11.7	2150.1857
Hackberry, Ariz.	L_3	193.9		-34.7	1083.0815	Flagstaff, Ariz.	U. S. G. S. 6907.	425.2		+16.3	2104.6062
Near Hackberry, Ariz.	M_3	195.4		-31.9	1094.5951	Do.	E_5	425.5		+16.8	2102.7596
Tinnaka, Ariz.	N_3	202.3	202.0	-30.7	1164.3314	Near Flagstaff, Ariz.	U. S. G. S. 6844.	428.9		+24.2	2184.3546
Crozier, Ariz.	O_3	206.2		-29.5	1209.6236	Do.	U. S. G. S. 6843.	430.5		+21.7	2084.9646
Near Crozier, Ariz.	P_3	209.3		-25.2	1256.7372	Near Cosmino, Ariz.	F_5	443.5		+17.6	1966.2439
Near Truxton, Ariz.	Q_3	211.3		-21.7	1277.2164	Winona, Ariz.	G_5	450.0		+10.4	1899.5165
Near Cherokee, Ariz.	R_3	224.4		- 7.2	1385.6208	Near Winona, Ariz.	H_5	455.1		+14.3	1849.4026

* From L_5 at Goffs.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Results of leveling, Goffs, Cal., to Albuquerque, N. Mex., 1909—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Near Angell, Ariz....	I ₂	462.6		+ 7.5	1766.8663	Near Guam, N. Mex..	O.....	766.3		+ 2.5	2169.0437
Near Hibbard, Ariz....	J ₂	467.8		+ 1.2	1701.4995	Near Gonzales, N. Mex.	P.....	768.0		+ 7.8	2183.4007
Do.....	K ₂	467.8		+ 2.2	1699.6642	Gonzales, N. Mex....	Q.....	770.7		+10.2	2210.5337
Do.....	L ₂	470.6		+ 8.5	1671.8675	Near Gonzales, N. Mex.	R.....	771.9		+12.5	2199.8867
Near Canyon Diablo, Ariz.	M ₂	473.8		+ 7.9	1659.4903	Thoreau, N. Mex....	S.....	778.6		+15.0	2173.9716
Do.....	N ₂	476.7		+ 1.2	1654.8918	Near Thoreau, N. Mex.	T.....	781.2		+16.2	2152.7306
Do.....	O ₂	476.9		+ 1.5	1654.9128	Near Chaves, N. Mex.	U.....	785.7		+18.1	2124.9545
Near Sunshine, Ariz....	P ₂	483.6		+ 5.8	1631.6823	Near Baca, N. Mex....	V.....	793.8		+23.4	2082.4986
Do.....	Q ₂	484.9		+ 4.1	1630.1693	Do.....	W.....	797.2		+14.7	2070.0969
Do.....	R ₂	488.4		+ 4.9	1612.5105	Do.....	X.....	798.9		+11.9	2057.4535
Do.....	S ₂	491.9		+ 6.8	1572.2215	Near Bluewater, N. Mex.	Y.....	802.3		+ 9.6	2049.0174
Near Dennison, Ariz....	T ₂	496.5		- 3.4	1537.7523	Do.....	Z.....	803.9		+ 9.1	2045.4846
Do.....	U ₂	501.3		- 6.0	1527.4235	Do.....	A ₁	812.5		+ 4.4	2008.2232
Near Winslow, Ariz....	V ₂	511.9		- 7.1	1485.8771	Near Toltec, N. Mex..	B ₁	819.6		+11.6	1989.6643
Do.....	W ₂	515.8		-16.2	1498.6223	Near Grants, N. Mex.	C ₁	823.2		+13.8	1986.0189
Winslow, Ariz.....	X ₂	519.5		-26.0	1479.6269	Grants, N. Mex.....	D ₁	825.7		+ 9.2	1970.6649
Near Winslow, Ariz....	Y ₂	524.1		-34.9	1481.8018	Near Grants, N. Mex.	E ₁	826.3		+10.0	1967.2669
Do.....	Z ₂	524.3		-34.2	1481.7396	Near Horace, N. Mex.	F ₁	834.5		+14.6	1943.3106
Near Hobson, Ariz....	A ₂	533.3		-17.1	1489.8550	Do.....	G ₁	839.0		+21.9	1917.2755
Near Hardy, Ariz....	B ₂	541.8		- 1.0	1501.3522	Near McCartys, N. Mex.	H ₁	844.2		+23.2	1894.5771
Near Manila, Ariz....	C ₂	547.5		+ 1.1	1511.4156	Do.....	I ₁	844.7		+24.3	1889.7195
Near Joseph City, Ariz.	D ₂	554.1		+ 7.7	1521.2998	McCartys, N. Mex....	J ₁	846.4		+21.2	1878.8127
Do.....	E ₂	557.9		+ 1.9	1527.1911	Near Alaska, N. Mex.	K ₁	853.4		+29.7	1845.4118
Near Penzance, Ariz....	F ₂	562.6		+ 3.9	1535.9553	Do.....	L ₁	860.4		+30.1	1824.8649
Do.....	G ₂	564.4		+ 1.9	1538.4049	Near Cubero, N. Mex.	M ₁	863.9		+29.8	1806.9455
Near Holbrook, Ariz....	H ₂	568.0		- 2.2	1542.0429	Do.....	N ₁	867.9		+26.0	1794.2653
Holbrook, Ariz....	I ₂	572.3		- 4.6	1549.1667	Near Laguna, N. Mex.	O ₁	870.4		+27.9	1785.2983
Near Holbrook, Ariz....	J ₂	577.2		- 1.8	1556.0178	Do.....	P ₁	873.0		+26.0	1777.3445
Near Aztec, Ariz....	K ₂	582.1		- 1.7	1562.7430	Laguna, N. Mex....	Q ₁	874.4		+28.7	1766.7293
Do.....	L ₂	589.7		+ 2.6	1581.2749	Do.....	R ₁	874.6	874.4	+28.1	1764.9909
Do.....	M ₂	590.8		+ 3.4	1583.4405	Near Laguna, N. Mex.	S ₁	877.6		+33.9	1749.1537
Near Carrizo, Ariz....	N ₂	594.3		- 7.0	1590.6983	Do.....	T ₁	879.5		+30.7	1741.7216
Near Adamana, Ariz....	O ₂	602.5		-16.4	1607.5351	El Rito, N. Mex.....	U ₁	884.2		+29.3	1726.4527
Adamana, Ariz....	P ₂	605.4		-16.8	1614.4214	Near El Rito, N. Mex.	V ₁	889.6		+36.5	1715.0077
Near Adamana, Ariz....	Q ₂	608.5		-19.0	1625.8513	Near Armijo, N. Mex.	W ₁	891.1		+38.0	1711.6335
Near Pinta, Ariz....	R ₂	622.5		-22.5	1664.7319	Do.....	X ₁	897.7		+43.4	1693.3544
Do.....	S ₂	624.2		-19.0	1672.2983	Suwanee, N. Mex....	Y ₁	898.9		+46.4	1681.4676
Do.....	T ₂	628.4		-22.0	1685.4802	Near Suwanee, N. Mex.	Z ₁	905.2		+54.2	1661.0266
Do.....	U ₂	631.8		-22.5	1701.6988	Near Garcia, N. Mex.	A ₂	910.7		+59.2	1628.0948
Near Navajo, Ariz....	V ₂	632.2		-22.6	1702.0110	Do.....	B ₂	913.2		+59.4	1612.8083
Do.....	W ₂	634.2		-24.5	1708.2444	Do.....	C ₂	916.6		+60.0	1583.2179
Do.....	X ₂	641.9		-19.3	1731.0394	Near Rio Puerco, N. Mex.	D ₂	918.5		+60.2	1571.8125
Near Chambers, Ariz....	Y ₂	646.5		-25.3	1744.7234	Do.....	E ₂	923.2		+53.9	1553.4265
Chambers, Ariz....	Z ₂	648.9		-18.9	1752.3863	Near Pavo, N. Mex....	F ₂	926.8		+55.3	1538.4188
Near Sanders, Ariz....	A ₃	656.4		-22.0	1776.0126	Do.....	G ₂	929.7		+60.3	1558.3808
Sanders, Ariz....	B ₃	658.1		-22.6	1776.9108	Do.....	H ₂	932.7		+61.2	1579.6638
Near Sanders, Ariz....	C ₃	660.8		-29.1	1784.7145	Do.....	I ₂	933.6		+60.7	1584.2060
Near Houck, Ariz....	D ₃	667.9		-21.5	1808.2159	Near Sandia, N. Mex.	J ₂	941.1		+60.2	1621.8798
Do.....	E ₃	669.0		-22.4	1811.3601	Do.....	K ₂	947.6		+60.1	1581.4102
Houck, Ariz....	F ₃	670.2		-22.3	1815.7075	Near Manzana, N. Mex.	L ₂	950.2		+60.5	1558.1114
Near Allantown, Ariz....	G ₃	682.0		-15.3	1854.0013	Do.....	M ₂	951.7		+60.4	1540.2116
Near Lupton, Ariz....	H ₃	687.1		-20.7	1870.5761	Near Isleta, N. Mex..	N ₂	957.3		+62.0	1519.6363
Do.....	I ₃	688.8		-24.1	1875.2495	Do.....	O ₂	960.5		+64.2	1490.4858
Near Manuelito, N. Mex.	A ₄	694.0		-17.8	1891.5417	Isleta, N. Mex....	P ₂	961.0	960.5	+66.6	1492.5039
Do.....	B ₄	698.9		-21.2	1905.7288	Near Isleta, N. Mex..	Q ₂	964.0		+67.4	1493.7434
Do.....	C ₄	701.5		-23.8	1909.1342	Do.....	R ₂	964.2		+67.8	1493.7440
Do.....	D ₄	706.2		-21.4	1919.6355	Near Albuquerque, N. Mex.	S ₂	966.1		+71.4	1494.4403
Near Defiance, N. Mex.	E ₄	711.5		- 8.0	1938.6258	Do.....	T ₂	970.4		+68.8	1501.7722
Near West Yard, N. Mex.	F ₄	720.4		- 3.2	1968.0133	Albuquerque, N. Mex.	U ₂	976.2		+65.5	1502.8156
Gallup, N. Mex....	G ₄	726.3		-15.8	1982.9991	Do.....	V ₂	981.7		+61.3	1510.6140
Near Gallup, N. Mex.	H ₄	729.2		- 6.1	1995.5657	Near Isleta, N. Mex..	W ₂	981.9		+60.7	1509.4460
Do.....	I ₄	731.5		- 7.5	2001.2553	Do.....	X ₂	982.4		+63.1	1520.0071
Near Zuni, N. Mex....	J ₄	733.1		- 9.8	2003.2915	Do.....	Y ₂	982.4	981.9	+60.8	1508.7336
Do.....	K ₄	738.0		- 3.9	2021.3168						
Wingate, N. Mex....	L ₄	745.0		-13.7	2054.1140						
Near Perea, N. Mex....	M ₄	758.0		-14.3	2115.2834						
Guam, N. Mex....	N ₄	761.2		- 9.1	2133.0084						

* From L₂ at Goffs.

† These elevations are superseded by the standard elevations given later in this publication which depend on an adjustment.

EL RENO, OKLA., TO JERICHO, TEX.

This line was run by Ford Kurtz, Aid, between July 1 and September 14, 1909. The leveling started from three bench marks at El Reno and followed the line of the Chicago, Rock Island & Gulf Railway to Jericho, Tex.

Precise level No. 7 was used until July 17. Precise level No. 6, one of the intermediate type was used from July 17 to August 3, after which No. 7 was used to the end of the season.

Rods AA and BB were used. The length of these rods at 0° C. as determined by the Bureau of Standards and the Instrument Division of this Survey, were:

Date.	Rod AA.	Rod BB.
Feb. 15, 1909.....	Meters. 3.0004	Meters. 3.0010
Oct. 30, 1909.....	3.0007	3.0012

In accordance with paragraph 21 of the General Instructions, each rod was measured with a steel tape at least twice each month while in the field. These measurements showed that the lengthening of the rods found by the Instrument Division was uniformly distributed over the entire period of the leveling. The mean length of rods interpolated for various dates during the period of leveling was used in the computation. The index correction of rod AA was -0.2 millimeter and rod BB -0.3 millimeter.

The difference of elevation between the three bench marks recovered at El Reno agreed with those previously determined within the limit of the accuracy of the leveling.

The elevations in the following table are based on an elevation of 405.1837 meters, for bench mark 1327 RJ at El Reno, which is the adjusted elevation published on page 108 of "Precise Leveling in the United States 1903-1907."

Results of leveling, El Reno, Okla., to Jericho, Tex.

Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crep- ancy (B-F).	Observed ele- vation.†	Place.	Perma- nent bench mark.	Dis- tance to bench mark.*	Dis- tance to base of spur.*	Total dis- crep- ancy (B-F).	Observed ele- vation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Reno Junction, Okla.	1327 RJ	0.0		0.0	405.1837	Elk City, Okla.	P ₃	162.1		+23.4	583.5718
Fort Reno, Okla.	A ₂	6.2		- 3.9	425.4729	Do	Q ₃	162.5		+23.5	587.2390
Calumet, Okla.	B ₂	15.8		- 8.0	419.6824	Do	R ₃	162.6		+22.4	588.7026
Near Calumet, Okla.	C ₂	27.4		-13.6	440.3583	Near Elk City, Okla.	S ₃	171.2		+14.4	637.8188
Geary, Okla.	D ₂	34.4		- 5.6	469.5504	Meritt, Okla.	T ₃	174.1		+10.0	625.3203
Do	E ₂	34.9		- 4.7	472.5338	Doxey, Okla.	U ₃	183.0		+13.1	560.3188
Do	F ₂	35.4		- 4.8	482.7466	Do	V ₃	183.1		+13.0	560.1714
Do	G ₂	35.5		- 5.7	484.8750	Near Sayre, Okla.	W ₃	189.5		+ 5.2	560.8088
Near Geary, Okla.	H ₂	41.3		- 4.0	436.0810	Do	X ₃	190.2		+ 3.5	554.2118
Do	I ₂	47.1		- 5.0	429.1110	Sayre, Okla.	Y ₃	190.7		+ 3.3	550.9015
Bridgeport, Okla.	J ₂	49.2		- 0.8	434.7144	Do	Z ₃	191.8		+ 3.8	551.9593
Near Bridgeport, Okla.	K ₂	53.5		+ 1.3	435.6483	Near Sayre, Okla.	A ₄	198.4		+ 9.0	562.4033
McCool, Okla.	L ₂	60.1		+ 3.7	440.3779	Hext Ranch, Okla.	B ₄	204.3		+ 6.3	588.5195
Near Hydro, Okla.	M ₂	64.2		+ 4.1	447.9001	Near Erick, Okla.	C ₄	211.2		+ 9.1	617.1646
Hydro, Okla.	N ₂	68.1		+10.0	474.8369	Erick, Okla.	D ₄	214.6		+ 8.9	628.4050
Do	O ₂	68.7		+11.2	453.9727	Do	E ₄	214.9		+ 9.6	628.4276
Near Hydro, Okla.	P ₂	72.1		+14.4	456.3948	Near Erick, Okla.	F ₄	219.0		+ 5.1	616.4215
Near Weatherford, Okla.	Q ₂	77.1		+13.8	477.6181	Texola, Okla.	G ₄	226.9		+ 2.1	654.5990
Weatherford, Okla.	R ₂	81.6		+20.0	501.7888	Do	H ₄	227.1		+ 1.0	655.8434
Do	S ₂	81.9		+22.5	505.9606	Benonine, Tex.	H ₉	229.7		+ 0.2	654.0872
Near Weatherford, Okla.	T ₂	86.5		+25.7	516.4559	Fuller, Tex.	I ₉	235.7		+ 6.9	666.0794
Do	U ₂	87.8		+30.3	525.4892	Near Shamrock, Tex.	J ₉	246.6		- 4.6	700.5207
Do	V ₂	90.1		+28.9	548.5405	Shamrock, Tex.	K ₉	252.8		- 8.4	711.1211
Near Indianapolis, Okla.	W ₂	95.8		+23.5	511.5747	Do	L ₉	253.3		- 9.9	713.9511
Indianapolis, Okla.	X ₂	99.1		+16.5	507.9643	Near Shamrock, Tex.	M ₉	258.9		- 9.3	730.1064
Near Indianapolis, Okla.	Y ₂	105.3		+14.4	466.4738	Lela (formerly Story), Tex.	N ₉	262.9		- 7.5	735.7027
Clinton, Okla.	Z ₂	110.4		+18.6	454.3792	Near Ramsdell, Tex.	O ₉	267.8		- 3.6	759.7594
Do	A ₃	112.7		+17.3	462.5477	Ramsdell, Tex.	P ₉	273.1		- 4.9	780.1000
Do	B ₃	113.3		+17.1	477.2748	Do	Q ₉	273.3		- 4.9	781.8814
Do	C ₃	113.5		+16.5	477.5155	Near Ramsdell, Tex.	R ₉	282.7		+ 1.8	833.3390
Near Clinton, Okla.	D ₃	115.7		+12.7	456.2210	McLean, Tex.	S ₉	289.8		+10.2	871.4294
Do	E ₃	119.0		+ 9.3	471.7544	Do	T ₉	290.0		+ 8.6	873.3345
Near Parkersburg, Okla.	F ₃	120.0		+10.9	470.9889	Near McLean, Tex.	U ₉	296.4		- 1.2	902.8315
Parkersburg, Okla.	G ₃	122.9		+ 8.5	464.8471	Near Alameda, Tex.	V ₉	301.7		+ 5.1	917.0344
Near Parkersburg, Okla.	H ₃	132.1		+11.3	481.1469	Alameda, Tex.	W ₉	304.2		+ 4.4	928.6541
Foss, Okla.	I ₃	137.5		+21.3	495.6119	Do	X ₉	304.4		+ 5.5	922.8503
Do	J ₃	137.7		+21.1	500.2528	Near Alameda, Tex.	Y ₉	309.3		0.0	946.1982
Do	K ₃	137.9		+20.2	496.4930	Rockledge, Tex.	Z ₉	314.7		- 5.2	965.5598
Near Foss, Okla.	L ₃	143.8		+22.3	535.9915	Near Jericho, Tex.	A ₁₀	318.2		- 8.1	967.2732
Canute, Okla.	M ₃	149.9		+26.5	580.2150	Jericho, Tex.	B ₁₀	323.9		-12.4	976.1447
Near Canute, Okla.	N ₃	155.6		+25.9	592.7827						
Near Elk City, Okla.	O ₃	159.6		+24.9	592.2892						

* From 1327 RJ at Reno Junction.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

FORT WORTH TO EL PASO, TEX.

This line was run by C. M. Cade, Assistant, between April 4, 1910, and January 10, 1911. Three bench marks were recovered at Fort Worth. The leveling follows the Texas & Pacific Railway from Fort Worth to Sierra Blanca, and the Galveston, Harrisburg & San Antonio Railway from Sierra Blanca to El Paso, Tex.

The leveling determined the elevation of eight primary triangulation stations, Lamb, Patterson, Stanton, Stanton South Base, Scar, Odessa, Hays, and Allamore.

Precise level No. 8 was used. Rods AA and BB were used up to October 6, 1910, and rods R₁ and S for the remainder of the line. Their lengths as determined by the Instrument Division of this Survey were:

Date.	Rod AA.	Rod BB.	Date.	Rod R ₁ .	Rod S.
	Meters.	Meters.		Meters.	Meters.
Oct. 30, 1909.....	3.0007	3.0012	Sept. 20, 1910.....	3.0007	3.0002
Nov. 10, 1910.....	3.0004	3.0011	Feb. 13, 1911.....	2.9999	2.9996

In accordance with paragraph 21 of the general instructions each rod was measured with a steel tape at least twice each month while in the field. These measures failed to show when the change found by the Instrument Division occurred. It was assumed, therefore, that the change was gradual and distributed over the entire period of leveling. In the computations the mean length of the rods interpolated for various dates during the period of leveling was used. The index corrections were: Rod AA, -0.3 millimeter; rod BB, -0.4 millimeter; rod R₁, -0.8 millimeter; and rod S, -0.5 millimeter.

The new determination of the differences of elevation of the three bench marks recovered at Fort Worth agreed very closely with the previous determinations.

The elevations in the following table are based on an elevation of 188.6548 meters for M₁ at Fort Worth, which is the elevation published on page 574 of Appendix 3, 1903:

Results of leveling, Fort Worth to El Paso, Tex., 1910.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Fort Worth.....	U.....	-1.9		-1.9	184.7294	Near Wiles.....	U ₁₁	143.4		+25.7	362.0573
Do.....	M ₁	0.0		0.0	188.6548	Near Tiffin.....	V ₁₁	148.5		+32.6	400.7591
Do.....	C ₁₀	1.3		+0.4	190.3768	Tiffin.....	W ₁₁	149.5		+25.4	426.5407
Near Fort Worth.....	D ₁₀	3.2		-4.2	169.9167	Ranger.....	X ₁₁	153.2		+29.9	441.8819
Do.....	E ₁₀	7.1		-4.9	175.6766	Do.....	Y ₁₁	153.7		+30.2	440.2135
Near Benbrook.....	F ₁₀	12.4		-6.7	190.0425	Near Ranger.....	Z ₁₁	155.2		+28.4	446.5884
Benbrook.....	G ₁₀	14.1		-2.2	202.0455	Do.....	A ₁₂	160.6		+25.8	447.0386
Near Benbrook.....	H ₁₀	18.7		-2.5	240.0300	Olden.....	B ₁₂	164.3		+21.2	476.1788
Iona.....	I ₁₀	23.8		+3.9	208.8634	Near Eastland.....	C ₁₂	166.8		+25.0	455.3415
Aledo.....	J ₁₀	29.2		+9.6	270.7460	Eastland.....	D ₁₂	169.9		+30.2	436.0418
Do.....	K ₁₀	29.4		+9.9	271.9600	Near Eastland.....	E ₁₂	174.3		+22.5	448.4078
Near Aledo.....	L ₁₀	32.1		+6.1	245.7054	Len.....	F ₁₂	177.3		+20.8	458.3283
Do.....	M ₁₀	33.9		+7.2	249.4139	Cisco.....	G ₁₂	185.9		+28.2	496.0362
Near Anna.....	N ₁₀	38.1		+7.2	261.2622	Do.....	H ₁₂	186.2		+26.6	493.8204
Near Earls.....	O ₁₀	43.1		+10.1	274.8170	Near Cisco.....	I ₁₂	193.2		+26.9	504.8704
Earls.....	P ₁₀	44.0		+10.3	276.2637	Lamb A.....	Lamb A.....	198.6	193.2	+24.2	534.8021
Near Weatherford.....	Q ₁₀	45.8		+6.3	286.0485	Do.....	Lamb Ref. Mark.....	198.6	193.2	+23.6	534.6741
Weatherford.....	R ₁₀	49.0		+3.0	301.7396	Dothan.....	J ₁₂	198.0		+25.4	493.4025
Do.....	S ₁₀	49.9		+1.2	320.8632	Near Putnam.....	K ₁₂	202.2		+30.2	478.8256
Near Weatherford.....	T ₁₀	50.5		+1.9	308.2018	Putnam.....	L ₁₂	207.5		+30.1	488.7310
Do.....	U ₁₀	52.5		-2.1	319.8510	Do.....	M ₁₂	207.6		+20.2	490.1952
Near Weatherford.....	V ₁₀	55.7		-2.3	347.4182	Near Putnam.....	N ₁₂	211.5		+24.6	459.1702
Lambert.....	W ₁₀	61.0		-6.8	353.1561	Chautauqua.....	O ₁₂	217.9		+19.0	465.1138
Near Millsap.....	X ₁₀	66.3		-7.2	295.4481	Near Chautauqua.....	P ₁₂	222.7		+20.3	485.3184
Millsap.....	Y ₁₀	73.3		-3.1	250.6137	Near Baird.....	Q ₁₂	223.8		+20.6	497.5410
Near Millsap.....	Z ₁₀	77.4		+0.8	229.8846	Baird.....	R ₁₂	226.7		+28.9	521.2299
Bennetts.....	A ₁₁	78.3		+0.7	229.7384	Do.....	S ₁₂	227.2		+26.9	525.8412
Near Brazos.....	B ₁₁	86.8		-2.8	248.1484	Near Baird.....	T ₁₂	232.3		+28.7	580.3318
Do.....	C ₁₁	88.0		+0.9	238.0428	Clyde.....	U ₁₂	237.5		+38.9	605.7625
Brazos.....	D ₁₁	89.2		-0.9	246.4075	Near Clyde.....	V ₁₂	242.4		+31.2	612.4088
Near Santo.....	E ₁₁	95.4		-2.1	240.0557	Elmdale.....	W ₁₂	251.8		+21.2	543.5159
Do.....	F ₁₁	99.0		+0.9	245.4439	Abilene.....	X ₁₂	260.0		+20.0	522.1158
Santo.....	G ₁₁	100.3		+3.5	250.7682	Do.....	Y ₁₂	261.4		+18.7	526.0844
Near Santo.....	H ₁₁	106.4		+9.2	258.6099	Do.....	Z ₁₂	262.3		+17.2	525.8050
Judd.....	I ₁₁	109.3		+7.6	278.6569	Do.....	A ₁₃	262.9		+19.4	524.2231
Near Gordon.....	J ₁₁	114.9		+9.1	284.9137	Near Abilene.....	B ₁₃	269.1		+16.3	525.2349
Gordon.....	K ₁₁	117.9		+10.2	294.9047	Tye.....	C ₁₃	273.6		+12.6	548.5709
Near Mingus.....	L ₁₁	121.0		+14.6	291.4735	Do.....	D ₁₃	274.0		+14.4	547.0838
Mingus.....	M ₁₁	123.1		+16.7	292.1171	Near Merkel.....	E ₁₃	280.5		+29.9	541.5673
Near Mingus.....	N ₁₁	125.3		+19.7	290.7038	Merkel.....	F ₁₃	287.1		+31.0	570.2424
Strawn.....	O ₁₁	130.0		+26.5	303.6483	Do.....	G ₁₃	287.4		+31.1	571.7030
Do.....	P ₁₁	130.9		+26.3	304.1189	Do.....	H ₁₃	288.1		+32.1	570.6292
Near Strawn.....	Q ₁₁	134.5		+20.5	317.6110	Near Merkel.....	I ₁₃	291.9		+37.5	567.0647
Do.....	R ₁₁	137.0		+20.7	328.1414	Trent.....	J ₁₃	297.9		+41.0	583.7763
Near Wiles.....	S ₁₁	140.7		+24.9	344.6217	Do.....	K ₁₃	298.5		+39.6	584.6752
Wiles.....	T ₁₁	142.2		+24.4	354.3755	Near Eskota.....	L ₁₃	305.0		+39.4	595.9629

* From M₁ at Fort Worth.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Results of leveling, Fort Worth to El Paso, Tex., 1910—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Eskota.....	M ₁₃	311.7		+ 38.4	590.9148	Toyah.....	Q ₁₆			-141.1	890.7625
Near Sweetwater.....	N ₁₃	319.5		+ 30.1	607.5459	Do.....	R ₁₆			-141.2	891.5483
Do.....	O ₁₆	321.3		+ 28.5	610.0124	Near Toyah.....	S ₁₆			-146.1	920.2331
Sweetwater.....	P ₁₆	327.8		+ 34.6	663.4317	Do.....	T ₁₆			-144.3	955.8790
Do.....	Q ₁₆	328.5		+ 34.5	662.9713	Gomez.....	U ₁₆			-147.5	998.5415
Near Sweetwater.....	R ₁₆	334.0		+ 36.0	720.0554	Near Gomez.....	V ₁₆			-140.9	1029.7692
Roscoe.....	S ₁₆	340.9		+ 29.8	727.4329	Near San Martine.....	W ₁₆			-135.5	1135.6285
Near Roscoe.....	Patterson Δ	348.0	340.9	+ 17.0	726.6774	San Martine.....	X ₁₆			-139.3	1132.6133
Roscoe.....	T ₁₆	341.2		+ 34.1	727.5463	Do.....	Y ₁₆			-139.9	1133.4934
Near Roscoe.....	U ₁₆	346.1		+ 32.0	726.5200	Near San Martine.....	Z ₁₆			-136.6	1167.3364
Near Loraine.....	V ₁₆	356.6		+ 25.6	704.1666	Near Kent.....	A ₁₇			-141.8	1215.6442
Loraine.....	W ₁₆	358.6		+ 26.6	690.2467	Do.....	B ₁₇			-145.0	1261.0538
Do.....	X ₁₆	359.2		+ 24.7	688.3101	Kent.....	C ₁₇			-145.0	1284.1141
Near Colorado.....	Y ₁₆	367.4		+ 15.3	675.8280	Near Kent.....	D ₁₇			-145.9	1311.7258
Colorado.....	Z ₁₆	373.0		+ 16.6	630.3619	Do.....	E ₁₇			-148.2	1319.1480
Do.....	A ₁₇	373.8		+ 14.7	631.5501	Boracho.....	F ₁₇			-154.4	1359.0942
Near Westbrook.....	B ₁₇	374.7		+ 16.2	631.1023	Near Boracho.....	G ₁₇			-155.0	1341.4514
Westbrook.....	C ₁₇	381.8		+ 12.1	636.5760	Near Plateau.....	H ₁₇			-147.4	1245.7942
Near Westbrook.....	D ₁₇	389.1		+ 7.6	650.6473	Do.....	I ₁₇			-146.0	1225.2362
Near Westbrook.....	E ₁₇	396.4		+ 2.4	676.8681	Plateau.....	J ₁₇			-148.8	1201.7022
Iatan.....	F ₁₇	404.3		- 0.9	674.0999	Near Plateau.....	U. S. G. S. 3889			-156.8	1185.4634
Near Iatan.....	G ₁₇	408.7		+ 3.6	705.5464	Do.....	K ₁₇			-157.3	1177.9794
Near Coahoma.....	H ₁₇	413.5		+ 12.2	722.4626	Near Wild Horse.....	U. S. G. S. 3840			-161.3	1173.1356
Coahoma.....	I ₁₇	417.8		+ 19.8	733.7960	Do.....	U. S. G. S. 3826			-168.1	1168.7229
Near Coahoma.....	J ₁₇	420.7		+ 11.7	739.1964	Wild Horse.....	L ₁₇			-161.5	1173.6046
Near Big Springs.....	K ₁₇	432.2		+ 3.1	732.0331	Near Wild Horse.....	U. S. G. S. 3867			-170.5	1181.2183
Big Spring.....	L ₁₇	434.6		+ 4.6	732.2160	Do.....	M ₁₇			-174.9	1177.5977
Do.....	M ₁₇	434.6		+ 4.6	732.0701	Near Van Horn.....	N ₁₇			-170.3	1199.3409
Do.....	South End Meridian Line.	435.1	434.6	+ 3.8	741.8841	Van Horn.....	O ₁₇			-156.8	1234.0484
Near Big Spring.....	N ₁₇	440.9		- 8.5	736.3717	Do.....	U. S. G. S. 4039			-156.0	1233.8071
Do.....	O ₁₇	445.0		- 12.9	738.7112	Near Van Horn.....	U. S. G. S. 4239			-155.7	1294.6609
Morita.....	P ₁₇	452.3		- 10.8	754.7072	Do.....	U. S. G. S. 4395			-156.1	1342.2898
Near Morita.....	Q ₁₇	457.5		- 16.3	753.9091	Near Allamore.....	U. S. G. S. 4603			-152.2	1405.8267
Near Stanton.....	R ₁₇	462.8		- 26.5	784.5296	Do.....	P ₁₇			-152.7	1386.0543
Do.....	Stanton Δ	468.0		- 26.9	825.5943	Allamore.....	Allamore Δ			-157.1	1387.3327
Stanton.....	S ₁₇	470.0		- 26.9	815.0317	Near Allamore.....	Q ₁₇			-157.1	1378.3029
Do.....	T ₁₇	470.4		- 29.1	811.8878	Do.....	R ₁₇			-152.8	1359.0618
Near Stanton.....	U ₁₇	476.3		- 38.4	827.2178	Near Eagle Flat.....	S ₁₇			-154.2	1361.2107
Do.....	Stanton S. B. Δ	482.5		- 45.2	821.2040	Eagle Flat.....	T ₁₇			-159.4	1359.4357
Germania.....	V ₁₇	488.1		- 47.6	838.8364	Near Eagle Flat.....	U ₁₇			-167.6	1347.2676
Near Germania.....	W ₁₇	489.4		- 46.0	844.3102	Near Sierra Blanca.....	V ₁₇			-161.6	1328.3659
Near Midland.....	X ₁₇	495.0		- 41.9	849.0584	La Valley.....	W ₁₇			-170.2	1335.2210
Do.....	Y ₁₇	497.7		- 47.5	840.2758	Near Sierra Blanca.....	X ₁₇			-165.7	1340.1181
Midland.....	Z ₁₇	502.7		- 49.9	847.8576	Sierra Blanca.....	Y ₁₇			-150.2	1377.8343
Do.....	A ₁₈	503.1		- 51.7	845.7129	Near Sierra Blanca.....	Z ₁₇			-156.1	1389.3238
Near Midland.....	B ₁₈	510.3		- 58.1	866.4553	Etholen.....	A ₁₈			-166.9	1418.0941
Near Warfield.....	Scar Δ	515.0	514.1	- 61.8	880.7894	Near Etholen.....	B ₁₈			-166.9	1399.1438
Warfield.....	C ₁₈	519.5		- 63.8	874.7523	Lasca.....	C ₁₈			-161.5	1365.4392
Near Warfield.....	D ₁₈	521.8		- 61.2	871.9812	Near Torcer.....	D ₁₈			-158.2	1326.5944
Near Odessa.....	E ₁₈	527.1		- 58.2	878.7979	Torcer.....	E ₁₈			-157.4	1308.9648
Do.....	Odesa Δ	533.9	533.0	- 68.0	898.7045	Near Torcer.....	F ₁₈			-157.2	1287.2741
Odessa.....	F ₁₈	535.5		- 67.2	883.5098	Do.....	G ₁₈			-158.5	1235.6478
Do.....	G ₁₈	535.9		- 67.1	884.8442	Near Finlay.....	H ₁₈			-159.3	1214.9353
Near Odessa.....	H ₁₈	543.7		- 70.7	897.4087	Finlay.....	I ₁₈			-154.1	1204.3364
Douro.....	J ₁₈	552.9		- 74.5	939.7318	Do.....	J ₁₈			-161.3	1178.0622
Near Douro.....	K ₁₈	556.5		- 84.8	943.7444	Madden.....	K ₁₈			-156.0	1119.4501
Metz.....	L ₁₈	569.1		- 99.4	872.7080	Nulo.....	L ₁₈			-160.2	1087.9471
Near Metz.....	M ₁₈	573.4		- 96.0	884.0286	Fort Hancock.....	M ₁₈			-143.9	1095.7508
Do.....	N ₁₈	577.8		- 105.0	856.4843	Near Fort Hancock.....	N ₁₈			-146.6	1097.0476
Near Sand Hills.....	O ₁₈	582.7		- 107.1	837.3713	Iser.....	O ₁₈			-143.2	1118.5481
Sand Hills.....	P ₁₈	585.8		- 102.2	825.5163	Near Polvo.....	P ₁₈			-147.0	1125.3854
Near Sand Hills.....	Q ₁₈	589.3		- 102.6	814.7004	Do.....	Q ₁₈			-143.5	1123.2385
Monahans.....	R ₁₈	594.2		- 99.9	799.4728	Polvo.....	R ₁₈			-138.5	1113.3070
Near Monahans.....	S ₁₈	595.2		- 98.3	796.2017	Near Polvo.....	S ₁₈			-131.3	1090.4351
Do.....	T ₁₈	598.2		- 103.4	794.3023	Do.....	U. S. G. S. 3560			-131.8	1089.4673
Aroya.....	U ₁₈	603.1		- 103.8	812.7058	Near Fabens.....	T ₁₈			-124.0	1096.4985
Near Aroya.....	V ₁₈	607.0		- 102.4	808.8523	Fabens.....	U ₁₈			-123.7	1103.7201
Pyote.....	W ₁₈	617.5		- 111.4	798.6502	Do.....	V ₁₈			-122.4	1103.3755
Do.....	X ₁₈	618.6		- 110.0	800.3837	Near Fabens.....	U. S. R. S. 3572.14			-117.1	1101.9818
Near Pyote.....	Y ₁₈	624.4		- 106.5	795.1856	Near Clint.....	U. S. R. S. 3586.94			-113.8	1106.4822
Quito.....	Z ₁₈	634.1		- 122.4	818.9845	Clint.....	U. S. R. S. 3592.95			-104.3	1108.3120
Near Quito.....	A ₁₉	636.3		- 125.1	812.1793	Do.....	W ₁₈			-104.7	1108.3556
Do.....	B ₁₉	636.7		- 126.1	810.7089	Near Clint.....	X ₁₈			-106.4	1109.3652
Do.....	C ₁₉	637.3		- 127.2	809.5213	Do.....	U. S. R. S. 3600.09			-105.3	1110.4900
Near Barstow.....	D ₁₉	639.2		- 128.7	808.2671	Belen.....	Y ₁₈			- 95.7	1115.2887
Do.....	Hays Δ	641.1	638.2	- 124.8	833.1958	Do.....	Z ₁₈			- 94.3	1114.8947
Do.....	I ₁₉	643.1		- 128.3	781.8416	Do.....	A ₁₉			- 96.1	1114.7325
Barstow.....	J ₁₉	644.6		- 130.3	782.5682	Ysleta.....	B ₁₉			- 77.3	1122.8153
Near Barstow.....	K ₁₉	647.1		- 128.0	782.2276	Alfalfa.....	C ₁₉			- 70.5	1122.0001
Near Pecos.....	L ₁₉	650.5		- 129.8	782.6920	Near Alfalfa.....	D ₁₉			- 67.1	1127.3646
Do.....	M ₁₉	652.5		- 133.9	784.0168	El Paso.....	E ₁₉			- 67.8	1129.8560
Pecos.....	N ₁₉	655.4		- 134.7	788.6380	Do.....	F ₁₉			- 67.8	1129.3928
Do.....	O ₁₉	655.7		- 136.0	787.7794	Do.....	G ₁₉			- 70.7	1130.8960
Near Pecos.....	K ₁₉	662.0		- 136.5	806.0970	Do.....	H ₁₉			- 71.6	1130.1558
Near Hermosa.....	L ₁₉	666.1		- 146.6	819.5921	Do.....	U. S. G. S. 3698			- 73.0	1131.3378
Hermosa.....	M ₁₉	670.0		- 143.6	832.3709	Do.....	U. S. G. S. 365			- 72.9	1131.0234
Near Hermosa.....	N ₁₉	675.8		- 152.6	850.1886	Do.....	U. S. G. S. 366			- 72.1	1131.2244
Near Toyah.....	O ₁₉	682.0		- 150.1	868.4814	Do.....	City Bench Mark			- 73.3	1131.4913
Toyah.....	P ₁₉	686.2		- 140.3	886.4421						

* From M₂ at Fort Worth.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

JERICHO, TEX., TO ISLETA, N. MEX.

This line is a continuation of the line El Reno, Okla., to Jericho, Tex. It was run by C. M. Cade, Assistant, between June 5, 1911, and November 4, 1911. The leveling started from two bench marks in Jericho, Tex., and followed the line of the Chicago, Rock Island & Gulf Railway to Amarillo, Tex., then along the Atchison, Topeka & Santa Fe Railway to Isleta, N. Mex., where it connected with the line Goffs to Albuquerque. The results agreed with the previous determination within allowable limits of error.

Precise Level No. 10 was used. Rods R_2 and S were used up to August 31, 1911, and rods X and Y for the remainder of the season. The lengths of these rods at 0° C. as determined by the Instrument Division of this Survey were:

Date.	Rod R_2 .	Rod S.	Date.	Rod X.	Rod Y.
Feb. 13, 1911.....	Meters. 2.9999	Meters. 2.9996	Aug. 22, 1911.....	Meters. 3.0012	Meters. 3.0015
Nov. 23, 1911.....	3.0000	2.9997	Dec. 2, 1911.....	3.0009	3.0012

In accordance with paragraph 21 of the general instructions each rod was measured with a steel tape at least twice a month. These measurements showed that rods R_2 and S had held practically a constant length and that the shortening of rods X and Y was a gradual one. The mean of the measures for both sets of rods was used in the computation. The mean length of R_2 and S, was 2.9998 or a defect in length of 0.07 millimeter per meter, and the mean length of X and Y was 3.0012 or an excess in length of 0.40 millimeter per meter. The index corrections of rods R_2 and S were both equal to -0.9 millimeter; the index correction of rod X was -0.2 millimeter and of rod Y -0.4 millimeter.

The new difference of elevation between the two bench marks recovered at Jericho agreed with the difference as formerly determined within the limit of the accuracy of the leveling.

The elevations in the following table depend upon an elevation of 976.1447 meters as determined by the line El Reno to Jericho.

Results of leveling, Jericho, Tex., to Isleta, N. Mex., 1911.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Jericho, Tex.....	B ₁₀	0.0	.....	0.0	976.1447	Joel, Tex.....	M ₂₀	150.1	.....	+44.9	1148.2544
Near Jericho, Tex.....	I ₁₀	4.9	.....	- 8.2	972.2814	Near Joel, Tex.....	N ₂₀	153.3	.....	+48.5	1147.8888
Boydston, Tex.....	J ₁₀	9.5	.....	- 5.1	985.1002	Hereford, Tex.....	O ₂₀	160.2	.....	+55.1	1162.0741
Groom, Tex.....	K ₁₀	18.4	.....	+ 3.7	994.9504	Do.....	P ₂₀	160.7	.....	+53.8	1165.2403
Near Groom, Tex.....	L ₁₀	21.4	.....	+ 5.2	1003.5240	Do.....	Q ₂₀	161.0	.....	+51.8	1164.2888
Do.....	M ₁₀	24.5	.....	+ 0.9	1007.8900	Near Hereford, Tex.....	R ₂₀	167.0	.....	+49.0	1177.5422
Lark, Tex.....	N ₁₀	30.1	.....	+ 9.2	1028.2619	Summerfield, Tex.....	S ₂₀	174.3	.....	+48.0	1199.4791
Near Conway, Tex.....	O ₁₀	36.4	.....	+11.4	1044.0206	Near Summerfield, Tex.....	T ₂₀	177.4	.....	+49.7	1197.5339
Conway, Tex.....	P ₁₀	43.6	.....	+14.2	1053.6920	Do.....	U ₂₀	178.0	.....	+47.8	1198.8921
Near Conway, Tex.....	Q ₁₀	50.1	.....	+14.7	1057.7725	Black, Tex.....	V ₂₀	185.9	.....	+42.7	1217.4390
Yarnall, Tex.....	R ₁₀	57.1	.....	+18.0	1074.3557	Near Friona, Tex.....	W ₂₀	190.9	.....	+40.1	1220.4598
Near Yarnall, Tex.....	S ₁₀	64.6	.....	+17.0	1072.7989	Friona, Tex.....	X ₂₀	197.1	.....	+45.4	1220.9633
Royal, Tex.....	T ₁₀	71.6	.....	+18.5	1096.8317	Near Friona, Tex.....	Y ₂₀	203.5	.....	+51.7	1252.4309
Near Amarillo, Tex.....	U ₁₀	79.1	.....	+15.4	1100.2816	Parmerton, Tex.....	Z ₂₀	207.1	.....	+52.7	1272.9924
Do.....	V ₁₀	82.6	.....	+13.8	1113.8542	Near Parmerton, Tex.....	A ₂₁	210.3	.....	+55.2	1258.2433
Do.....	W ₁₀	83.3	.....	+12.9	1114.3468	Bovina, Tex.....	B ₂₁	217.0	.....	+62.0	1240.3071
Amarillo, Tex.....	X ₁₀	84.6	.....	+ 8.8	1117.9126	Near Bovina, Tex.....	C ₂₁	219.4	.....	+59.1	1234.6797
Do.....	Y ₁₀	85.7	84.6	+ 5.7	1116.7754	Do.....	D ₂₁	223.4	.....	+56.5	1245.1372
Zita, Tex.....	Z ₁₀	93.5	.....	+11.6	1112.9943	Wilsey, Tex.....	E ₂₁	228.1	.....	+59.9	1270.5748
Near Zita, Tex.....	A ₂₀	95.8	.....	+14.6	1113.6553	Near Wilsey, Tex.....	F ₂₁	231.3	.....	+59.3	1259.5472
Haney, Tex.....	B ₂₀	102.0	.....	+12.0	1109.9001	Texico, N. Mex.....	Q ₂₁	238.3	.....	+61.7	1264.1678
Near Canyon, Tex.....	C ₂₀	105.1	.....	+13.1	1095.1103	Do.....	R ₂₁	238.4	.....	+61.3	1264.7714
Canyon, Tex.....	D ₂₀	112.4	.....	+22.0	1082.4900	Near Texico, N. Mex.....	S ₂₁	244.6	.....	+69.2	1279.7278
Do.....	E ₂₀	113.5	.....	+23.5	1090.3404	Near Clovis, N. Mex.....	T ₂₁	250.7	.....	+63.5	1287.8586
Do.....	F ₂₀	114.0	.....	+24.2	1090.4540	Clovis, N. Mex.....	U ₂₁	253.0	.....	+61.2	1297.5296
Near Canyon, Tex.....	G ₂₀	116.4	.....	+24.4	1093.1557	Do.....	V ₂₁	253.4	.....	+58.7	1299.2714
Lester, Tex.....	H ₂₀	120.9	.....	+25.2	1117.8595	Do.....	W ₂₁	253.6	.....	+59.0	1301.3668
Umbarger, Tex.....	I ₂₀	129.8	.....	+32.2	1147.8887	Near Clovis, N. Mex.....	X ₂₁	257.5	.....	+61.0	1313.0789
Near Umbarger, Tex.....	J ₂₀	132.5	.....	+34.6	1144.4177	Near Blacktower, N. Mex.....	Y ₂₁	261.9	.....	+64.2	1313.5500
Dawn, Tex.....	K ₂₀	139.9	.....	+35.9	1156.1620						
Near Dawn, Tex.....	L ₂₀	143.9	.....	+36.3	1150.7182						

* From B₁₀ at Jericho.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

Results of leveling, Jericho, Tex., to Isleta, N. Mex., 1911—Continued.

Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†	Place.	Permanent bench mark.	Distance to bench mark.*	Distance to base of spur.*	Total discrepancy (B-F).	Observed elevation.†
		km.	km.	mm.	m.			km.	km.	mm.	m.
Blacktower, N. Mex.	Z ₂	262.6		+64.1	1316.5884	Near Carnero, N. Mex.	Z ₄	478.3		+65.3	1883.9136
Do.	A ₂	262.6		+64.5	1318.4618	Carnero, N. Mex.	A ₅	482.2		+70.8	1896.5351
Near Blacktower, N. Mex.	B ₂	263.9		+60.8	1328.4997	Near Encino, N. Mex.	B ₅	481.3		+74.7	1877.4485
Do.	C ₂	272.2		+55.5	1331.4444	Encino, N. Mex.	C ₅	491.4		+83.3	1865.9908
Near St. Vrain, N. Mex.	D ₂	281.7		+61.2	1340.4815	Near Encino, N. Mex.	D ₅	495.0		+80.2	1878.2854
Near Melrose, N. Mex.	E ₂	291.5		+75.1	1340.9951	Near Negra, N. Mex.	E ₅	496.4		+78.5	1879.9012
Melrose, N. Mex.	F ₂	292.6		+76.9	1340.7896	Negra, N. Mex.	F ₅	499.6		+71.9	1880.5043
Near Melrose, N. Mex.	G ₂	294.9		+76.4	1332.2174	Near Pedernal, N. Mex.	G ₅	505.6		+66.6	1919.3415
Cantara, N. Mex.	H ₂	303.2		+65.2	1343.4585	Pedernal, N. Mex.	H ₅	510.2		+64.3	1940.9778
Near Krider, N. Mex.	I ₂	308.6		+67.8	1321.8552	Dunmoor, N. Mex.	I ₅	515.7		+58.6	1942.5997
Krider, N. Mex.	J ₂	311.3		+65.7	1313.3714	Near Dunmoor, N. Mex.	J ₅	520.8		+60.6	1931.0412
Near Krider, N. Mex.	K ₂	314.9		+68.0	1305.7999	Do.					
Tolar, N. Mex.	L ₂	321.2		+72.0	1282.1907	Near Lucy, N. Mex.	K ₅	526.7		+58.6	1885.4941
Near Tolar, N. Mex.	M ₂	323.6		+73.6	1274.7237	Do.	L ₅	530.3		+61.1	1881.2668
Taiban, N. Mex.	N ₂	328.6		+75.1	1257.5705	Lucy, N. Mex.	M ₅	531.8		+62.3	1882.5357
Near Taiban, N. Mex.	O ₂	329.0		+73.8	1256.3765	Near Lucy, N. Mex.	N ₅	538.5		+68.7	1858.4393
Do.						Near Silio, N. Mex.	O ₅	543.4		+69.1	1854.4391
Near La Lande, N. Mex.	P ₂	336.0		+66.4	1240.2285	Willard, N. Mex.	P ₅	552.2		+72.0	1857.9957
La Lande, N. Mex.	Q ₂	340.0		+67.7	1254.2743	Do.	Q ₅	552.5		+73.1	1857.4899
Near Fort Sumner, N. Mex.	R ₂	345.4		+72.1	1255.3330	Do.	R ₅	553.2		+71.6	1861.7867
Do.	S ₂	349.7		+68.3	1236.3047	Near Willard, N. Mex.	S ₅	559.5		+72.9	1891.6268
Fort Sumner, N. Mex.	T ₂	350.3		+70.4	1237.1399	Broncho, N. Mex.	T ₅	564.9		+73.9	1923.7280
Do.	U ₂	350.9		+72.2	1240.4976	Do.	U ₅	566.0		+73.5	1920.3048
Near Fort Sumner, N. Mex.	V ₂	351.9		+68.7	1235.3806	Near Mountainair, N. Mex.	V ₅	569.5		+76.3	1916.3650
Fort Sumner, N. Mex.	U. S. G. S. Fort Sumner.	353.5	353.1	+65.1	1233.5603	Mountainair, N. Mex.	W ₅	574.9		+75.1	1977.2685
Near Fort Sumner, N. Mex.	W ₂	353.7		+66.6	1243.4374	Do.	X ₅	575.3		+73.0	1980.9341
Do.	X ₂	354.2		+68.1	1246.2730	Near Mountainair, N. Mex.	Y ₅	577.9		+74.4	1986.1440
Do.	Y ₂	357.7		+67.2	1266.1572	Do.	Z ₅	580.9		+78.5	1930.0447
Agudo, N. Mex.	Z ₂	363.1		+70.4	1297.8492	Abo, N. Mex.	A ₆	585.5		+67.8	1876.1738
Ricardo, N. Mex.	A ₃	372.7		+61.5	1345.3733	Near Abo, N. Mex.	B ₆	586.9		+65.4	1872.1486
Near Ricardo, N. Mex.	B ₃	377.0		+63.8	1362.1739	Do.	C ₆	591.6		+62.6	1822.4475
Do.						Near Scholle, N. Mex.	D ₆	597.2		+68.4	1768.3488
Evanola, N. Mex.	C ₃	383.5		+62.3	1395.8169	Do.	E ₆	598.0		+69.6	1757.7479
Near Yeso, N. Mex.	D ₃	390.0		+55.7	1431.4242	Do.	F ₆	600.6		+70.7	1723.3191
Yeso, N. Mex.	E ₃	394.7		+51.1	1455.1868	Near Sals Siding, N. Mex.	G ₆	605.3		+69.7	1673.6702
Do.	F ₃	395.0		+51.3	1456.5909	Sals Siding, N. Mex.	H ₆	606.7		+71.0	1659.5770
Largo, N. Mex.	G ₃	405.0		+56.3	1513.9908	Becker, N. Mex.	I ₆	616.7		+71.3	1578.8532
Near Largo, N. Mex.	H ₃	406.8		+59.3	1521.5204	Do.	J ₆	617.0		+73.4	1577.5758
Buchanan, N. Mex.	I ₃	414.1		+62.8	1563.1195	Near Bodega, N. Mex.	K ₆	625.9		+71.0	1526.5444
Near Buchanan, N. Mex.	J ₃	415.4		+62.2	1567.8816	Near Madrone, N. Mex.	L ₆	630.7		+68.1	1498.7844
Do.	K ₃	418.8		+66.8	1587.1211	Do.	M ₆	634.3		+75.2	1481.7530
Cardenas, N. Mex.	L ₃	423.4		+68.2	1614.2614	Near Belen, N. Mex.	N ₆	636.8		+77.8	1465.0000
Near Cardenas, N. Mex.	M ₃	425.5		+69.5	1623.2167	Do.	O ₆	637.0		+78.0	1465.3163
Duoro, N. Mex.	N ₃	435.0		+72.6	1658.0027	Do.	P ₆	641.8		+82.2	1466.2749
Near Duoro, N. Mex.	O ₃	438.0		+74.3	1670.4176	Near Belen, N. Mex.	Q ₆	641.9		+82.7	1465.1263
Do.	P ₃	442.6		+77.9	1694.1661	Near Los Lunas, N. Mex.	R ₆	644.2		+85.1	1465.8551
Casas, N. Mex.	Q ₃	446.0		+81.5	1712.7209	Do.	S ₆	658.5		+98.4	1479.0221
Near Casas, N. Mex.	R ₃	448.7		+82.1	1726.1374	Near Los Lunas, N. Mex.	T ₆	662.9		+97.6	1481.9132
Iden, N. Mex.	S ₃	456.8		+77.6	1772.0350	Do.	U. S. G. S. 4833.	653.4		+93.8	1473.4047
Near Vaughn, N. Mex.	T ₃	460.8		+77.3	1793.0967	Do.	R ₆	655.5		+96.2	1475.0929
Vaughn, N. Mex.	U ₃	465.0		+72.1	1818.0887	Los Lunas, N. Mex.	S ₆	658.2		+96.7	1480.2333
Do.	V ₃	465.3		+72.7	1818.4709	Do.	U. S. G. S. 4851.	658.5		+98.4	1479.0221
Near Vaughn, N. Mex.	W ₃	467.5		+75.0	1823.2421	Near Los Lunas, N. Mex.	T ₆	662.9		+97.6	1481.9132
Do.	X ₃	469.1		+81.1	1828.9185	Near Isleta, N. Mex.	U. S. G. S. 4891.	669.6		+97.3	1490.8125
Tejon, N. Mex.	Y ₃	473.5		+71.6	1856.2093	Isleta, N. Mex.	N ₇	670.2		+96.8	1492.8329

* From B₁₀ at Jericho.

† These elevations are superseded by the standard elevations given later in this publication, which depend on an adjustment.

DETAILS OF LINES RUN BY THE UNITED STATES GEOLOGICAL SURVEY.

ALBUQUERQUE, N. MEX., TO EL PASO, TEX.

This line was run in 1905 by M. S. Bright along the Atchison, Topeka & Santa Fe Railway. The United States Coast and Geodetic Survey line between Goffs, Cal., and El Reno, Okla., was connected with it at Isleta, Belen, and Albuquerque, N. Mex. The United States Coast and Geodetic Survey line Fort Worth to El Reno was connected with it at El Paso. It thus serves as a link between them and together with the United States Coast and Geodetic Survey lines Galveston to Fort Worth to El Paso and San Diego to Goffs to Albuquerque forms a direct connection between the Gulf of Mexico and the Pacific Ocean.

DUQUOIN, ILL., TO SHAWNEETOWN, ILL.

This line was run in 1906 by T. A. Green. The leveling started from United States Coast and Geodetic Survey bench mark R_3 at Duquoin and followed the Illinois Central Railroad to Shawneetown, Ill.

MITCHELL, IND., TO OAKLAND, ILL.

This line started from the United States Coast and Geodetic Survey bench mark X at Mitchell, Ind., and followed the Chicago, Indianapolis & Louisville Railway to Elliston, Ind. From Elliston to Terre Haute, Ind., the line followed the Chicago & Eastern Illinois Railroad, thence the Vandalia Railroad was followed to Oakland, Ill.

The leveling Robinson to Bloomfield, Ind., was done in 1906 by T. A. Green, the remaining portions of the line Mitchell to Robinson, Ind., and Bloomfield, Ind., to Oakland, Ill., were done in 1906 and 1907, respectively, by C. H. Semper.

At Oakland connection is made with the United States Geological Survey line from Pekin to Olney, Ill.

GEORGETOWN TO LOUISVILLE, KY.

This line was run in 1906 by C. H. Semper. The leveling started from United States Coast and Geodetic Survey bench mark W at Georgetown and followed the Frankfort & Cincinnati Railway and the Louisville & Nashville Railroad to Louisville, Ky.

At Louisville the line connected with two bench marks of the Ohio River Survey.

MITCHELL, IND., TO LOUISVILLE, KY.

This line was run in 1911 by E. L. McNair. The leveling started from United States Coast and Geodetic Survey bench mark X at Mitchell, Ind., and followed the Chicago, Indianapolis & Louisville Railroad to Louisville, Ky., where it connected with the line Georgetown to Louisville and two bench marks of the Ohio River Survey.

DETAILS OF LINES RUN BY THE UNITED STATES ENGINEERS.

LAWRENCEBURG, IND., TO CAIRO, ILL.

This line is a continuation of the line of precise levels from Pittsburgh, Pa., to Petersburg, Ky., run along the Ohio River under the direction of the Chief of Engineers. The instruments and methods used on this work are described on page 347, Appendix 3, Report of 1903. The field work was done in 1903, 1906, and 1907.

TERRE HAUTE, IND., TO SHAWNEETOWN, ILL.

This line of levels was run in connection with a Survey of the Wabash River in 1911. The instruments and the methods were the same as those in use by the Mississippi River Commission.

The leveling started from four bench marks of the United States Geological Survey and followed the course of the Wabash River to its junction with the Ohio River thence down the Ohio River to Shawneetown, Ill.

The following bench marks were recovered:

Two bench marks of the United States Coast and Geodetic Survey at Vincennes, Ind.

Two bench marks of the Ohio River Survey between the mouth of the Wabash River and Shawneetown, Ill.

Three bench marks of the United States Geological Survey at Shawneetown, Ill.

The new determination of the differences of elevation between the recovered bench marks agreed with the previous determinations within the limits of the accuracy of the leveling.

ORTHOMETRIC AND DYNAMIC CORRECTIONS.*

As stated on page 5, it was found to be necessary to apply a correction to the observed elevations, in addition to that necessary to close the circuits, on account of the nonparallelism of level surfaces.

* Lallemand discusses at length the orthometric and dynamic corrections on pages 358 to 387 of his "Nivellement de Haute Précision" in the *Encyclopédie des Travaux Publics*, Paris et Liège, 1912.

A level surface is one which is everywhere perpendicular to the direction of gravity, as defined by the plumb line. The surface of still water at a uniform temperature is level. A level surface is also called an equipotential surface, meaning thereby that every point on it has the same gravity potential. The difference in potential between two equipotential surfaces is equal to the work done by or against gravity * in moving a unit mass from a point on one surface to a point on the other surface. The work or difference of potential is independent of the particular points that may be chosen or of the path between them. The work in passing from one point to another on the same level surface is zero. Potential and equipotential surfaces and their properties are discussed in many books, such as: Helmert's "*Die Mathematischen und Physikalischen Theorien der Höheren Geodäsie: II Theil.*" In ordinary spirit leveling it is assumed that, if the field work could be made sufficiently exact, the same difference of elevation between two points would be obtained, irrespective of the route followed. It is implied that level surfaces are parallel to each other.

As stated above, this is not true, but the error introduced by this assumption in the results of leveling which is not of a high grade is small compared with the errors of leveling, and may be neglected.

In precise leveling a correction must be applied to the observed differences in elevation on account of the nonparallelism of level surfaces, and this is most important on north-and-south lines especially when the average elevation of the line is great. This correction would be small and probably negligible on a line run along a coastal plain.

The surface of the sea and other level surfaces above or below it are approximately spheroidal in shape, but each of the surfaces above sea level has a greater proportional flattening than the sea surface, and consequently such a surface will be at a shorter distance from sea level at the poles than at the equator. A level surface 1000 meters above the sea at the equator would be only 995 meters above the sea at the poles. The polar convergence of other level surfaces toward sea level is approximately in the same proportion to their elevation; for instance, a level surface 500 meters above the sea at the equator would be $497\frac{1}{2}$ meters above it at the poles, etc.

If a line were drawn whose tangent everywhere coincided with the direction of gravity—i. e., with the perpendicular at every point to the level surface through that point—this line would not be straight but slightly curved and concave toward the earth's axis. Strictly speaking, there is therefore some ambiguity in the expression "elevation" of a point above sea level. The distance between a point and the sea level might be measured: (1) Along a curved line of the kind just mentioned passing through the point; (2) along a straight line perpendicular to the level surface at the point in question and extending down to sea level; (3) along a straight line perpendicular to the sea-level surface and passing through the point in question. This third kind of line is the one commonly used in geodesy for reducing to sea level, to obtain a point on the sea-level surface corresponding to a point above it. But as long as only the lengths of these lines are considered, it is entirely indifferent which length is selected to measure, since if one of these lengths be 10000 meters—higher than the highest mountain on the earth—the others will differ from it by less than a thousandth of a millimeter. This source of ambiguity may, therefore, be neglected, but the ambiguity arising from the route followed remains to be considered.

The manner in which discordant differences of level between two points are obtained by following different routes between them may be illustrated by a simple ideal case. Suppose a still lake, lying north and south, is situated on the edge of a level plateau near the sea in the Northern Hemisphere. Let B be a point at the lake's surface near the middle, and A a point at sea level in the same latitude as B. Let one line of levels be carried by water leveling north from A to C, a point at sea level and in the same latitude as the north end of the lake, then directly upward to D, at the north end of the lake's surface, then by water leveling along the lake southward to B. The difference of level between A and B, or between A and any point of the lake's surface, will come out equal to the elevation of D above C. Let another line of levels be run southward from A by water levels to E, at sea level and in the same latitude as F at the south

* Gravity is considered to be the resultant of gravitation (the attraction of the earth's mass) and the centrifugal force due to the earth's rotation.

end of the lake's surface, then directly up from E to F and northward by water levels on the lake to B. The difference of level between A and B, or between A and any point on the lake's surface, will now come out equal to the elevation of F above E, and will be greater than the apparent elevation by the first route, since the two level surfaces approach each other as they near the north pole; and neither result will agree with the result of measuring directly upward from A to B.

There are two methods of correcting this ambiguity, so that except for errors of observation one may always arrive at the same result for the same point. One method is to correct the difference of level in such a manner that one may obtain the actual distance between B and the sea level, or in the general case, between a point and the geoid. This elevation is called the orthometric elevation of B, and the correction to the measured difference of elevation to obtain the orthometric elevation from the observed results of leveling is called the *orthometric correction*. It is to be noted (1) that one may speak, not of the orthometric correction to an elevation, but of the orthometric correction to a difference of elevation for a given route; (2) that points on the same level surface have different orthometric elevations if they lie in different latitudes, and that, therefore, conversely points in different latitudes, having the same orthometric elevation, lie on different level surfaces. This inconvenience has led to the second method, which discards the simple conception of measured length altogether, and gives to each surface a number of its own. Instead of giving the elevation of a point above sea level, a serial number is given to the level surface on which it lies. The points F, B, and D on the lake-level surface would bear the same number. For convenience, the system of numbering these surfaces is such that the number of a level surface is not very different from the height (in the unit chosen) of any point in the surface. The serial number of a level surface is called its *dynamic number*,* and is defined as follows: In the metric system the dynamic number of a point is the work required to raise a mass of 1 kilogram against the force of gravity from sea level to the level surface passing through the point, the work being measured in standard kilogram-meters at sea level in latitude 45° . If the English system be used, the kilogram in the preceding statement is replaced by the pound, and the kilogram-meter by the corresponding standard foot-pound. More generally, to get the dynamic number in any system of units, the work which is necessary to raise a unit mass from sea level to the level surface in question is expressed in absolute units and the result divided by g_{45} , where g_{45} is the normal acceleration of gravity at sea level in latitude 45° .

The quantity which must be added to the orthometric elevation of a point to obtain the dynamic number is called the *dynamic correction*.

The exact determination of orthometric and dynamic corrections would require a knowledge of the force of gravity at every point of the line of levels. To get a sufficient approximation to this knowledge by direct observation at numerous points on the line is, at present, impracticable. If it is assumed that the force of gravity is given by one of the usual mathematical expressions, a fair approximation to the truth will, in general, be obtained. The following expression† is taken for the force of gravity g at any point in latitude ϕ and at an orthometric elevation h :

$$g = g_{45}(1 - \alpha \cos 2\phi + \beta \cos^2 2\phi - kh); \quad (1)$$

g_{45} has the meaning previously given; α , β , and k are constants, α and β being independent of the unit used and equal, respectively, to 0.002644 and 0.000007; $g_{45} = 980.624$ dynes and $k = 0.0000003147$, if h is in meters; or, more strictly,

$$k = \frac{3147}{10^{10}}(1 + \frac{71}{10^5} \cos 2\phi - \frac{23}{10^8} h),$$

or for brevity, $k = k'(1 + \gamma \cos 2\phi - ch) \ddagger$

* The phrase *dynamic number* is an attempt to render into English the French expression *cote dynamique*, or its equivalent, *dynamische Kote*, as used by German writers.

† Equivalent to the expression given by Helmert.

‡ Sitzungsberichte der Königl. Preussischen Akademie der Wissenschaften, 1903, erste Halbband, seite 651.

Let W be the work of raising a unit mass from sea level to a point at orthometric elevation h and H the dynamic number of the level surface on which the point lies. The curved vertical of length h is chosen as the most convenient path for passing from sea level to the given point.

$$\begin{aligned}\text{Then} \quad W &= \int_0^h g dh = g_{45} \int_0^h (1 - \alpha \cos 2\phi + \beta \cos^2 2\phi - kh) dh \\ W &= g_{45} (1 - \alpha \cos 2\phi + \beta \cos^2 2\phi) h - k' \frac{h^2}{2} (1 + \gamma \cos 2\phi - \frac{2}{3} ch)\end{aligned}$$

By definition $H = \frac{W}{g_{45}}$, or

$$H = h - (\alpha \cos 2\phi - \beta \cos^2 2\phi) h - k' \frac{h^2}{2} \left(1 + \gamma \cos 2\phi - \frac{2}{3} ch \right) \quad (2)$$

This gives the connection between the orthometric elevation and dynamic number. Since H is by definition constant for a level surface, equation (2) may be regarded as the equation of the level surface in coordinates ϕ and h . Let there be a neighboring point on the surface with coordinates $\phi + d\phi$ and $h + dh$. The relation that $d\phi$ and dh must satisfy will be found by differentiating (2), noting that H is constant. It is

$$dh = \frac{-2h(\alpha \sin 2\phi - \beta \sin 4\phi + k'h \frac{\gamma}{2} \sin 2\phi) d\phi}{1 - \alpha \cos 2\phi + \beta \cos^2 2\phi - k'h(1 + \gamma \cos 2\phi - ch)} \quad (3)$$

or

$$dh = -2h\alpha \sin 2\phi \left[1 + \left(\alpha - \frac{2\beta}{\alpha} \right) \cos 2\phi + k'h \left(1 + \frac{\gamma}{2\alpha} \right) + \dots \right] d\phi \quad (4)$$

The term in $k'h$ may be neglected as insignificant in comparison with uncertainties due to errors of observation. On the line of levels from San Diego to Seattle, with an average elevation of about 1000 meters, and stretching through a difference of latitude of about 15° , the orthometric correction amounted to about one and one-quarter meters, while the term in question had an effect of less than half a millimeter. The neglected terms in (4), involving higher powers in α , β , and $k'h$ have even less effect on the result, so for all practical purposes the equation may be written:

$$dh = -2h\alpha \sin 2\phi \left[1 + \left(\alpha - \frac{2\beta}{\alpha} \right) \cos 2\phi \right] d\phi \quad (5)$$

By this equation one may compute the orthometric correction to an observed difference in elevation. After corrections have been applied for curvature and refraction, the two points sighted on the level rods are on the same level surface. The rods measure the distances from this level surface to the points on which they rest, but since the point on the more northerly rod (speaking for the northern hemisphere) is nearer sea level than the corresponding point of the level surface on the other rod by an amount which may be calculated from (5), the observed difference in rod readings must be corrected by (5) to obtain the required difference in elevation above sea level. Equation (5) may be extended to far greater distances than those of a single sight by using for h the average height of the instrument between the points whose difference in elevation is to be found.

Tables on pages 54 to 56 contain quantities useful in computing from (2) and (5) the orthometric and dynamic corrections.

In table 1 the argument is the latitude; the quantities tabulated in the second and third columns are for computing by (5) and consist, respectively, of the factor $2\alpha \sin 2\phi \left[1 + \left(\alpha - \frac{2\beta}{\alpha} \right) \cos 2\phi \right] \sin 1'$, called C , and its logarithm; $\sin 1'$ is included so that $d\phi$ may be taken in minutes of arc. The orthometric correction to the difference of elevation between two points (elevation of second point minus elevation of starting point) is then $-Chd\phi$, where h is the average elevation of the instrument between the points, $d\phi$ is the difference of latitude in minutes, positive when the second point is north of the first. Any unit of length may be used for h ; the orthometric correction computed as above is then expressed in the same unit.

The fourth and fifth columns contain, respectively, the quantities $\alpha \cos 2\phi - \beta \cos^2 2\phi$ (called D_1) and its logarithm.

The expression $-(\alpha \cos 2\phi - \beta \cos^2 2\phi)h = -D_1 h$ constitutes the dynamic correction for latitude and is expressed in the same unit as h . The remaining term of (2), $-k \frac{h^2}{2} \left(1 + \gamma \cos 2\phi - \frac{2}{3} ch\right)$, constitutes the dynamic correction for elevation. In table 2, $\frac{k'}{2} \left(1 + \gamma \cos 2\phi - \frac{2}{3} ch\right)$, abbreviated as D_2 , is tabulated under the two arguments ϕ and h (expressed in meters), and in Table 2a $\log D_2$ is given for the same arguments. The total dynamic correction is then $-D_1 h - D_2 h^2$.

Example 1: If the elevation above sea level of Lake Michigan be 177 meters at Chicago, latitude $41^\circ 53'$, what is it at Milwaukee, in latitude $43^\circ 03'$? In making the computation the mean elevation of the lake, h , may be assumed to be 177 meters. $d\phi = +70'$. The tables give C for the middle latitude, $42^\circ 28'$, as .000001532; whence the elevation at Milwaukee $= 177 - Chd\phi = 177 - 0.0190 = 176.9810$ meters.

Example 2: Suppose levels are to be carried from A , in south latitude $30^\circ 35'$, to a point B , in south latitude $30^\circ 17'$, and that the average elevation of the instrument between these points is 600 meters. For the middle latitude $30^\circ 26'$ the table gives $C = -.000001342$, the negative sign following from the rule at the head of the table, and $d\phi = -30^\circ 17' - (-30^\circ 35') = +18'$. The correction to the quantity (Observed elevation at B - Observed elevation at A) is then $-600 \times (-.000001342) \times 18 = +.0145$ meters.

For examples of computation of dynamic numbers from the orthometric elevations the table on pages 83-84 may be consulted.

An idea of how closely actual gravity at a point conforms to the value derived from the formulas used above, which give the values in "free-air," may be obtained by consulting page 12 of Special Publication No. 12 of the United States Coast and Geodetic Survey.

It may be noted that, granted numerous observations of the relative intensity of gravity along the line of leveling, the dynamic numbers may be obtained free from any hypothesis as to the change in the intensity of gravity much more readily than the orthometric elevations. Suppose it is assumed that the dynamic number of a certain point is known and that it is desired to carry it forward by leveling to a second point, not far distant. For this purpose, besides the observed difference of level, there is needed the average intensity of gravity along the line, which may be taken as the value of gravity at a point whose projection on the geoid is the middle point of the line joining the projections of the two points and whose elevation is the mean of the elevations, which need not be known with the greatest exactness. This value could be obtained by direct observation or by interpolation from adjacent gravity stations. Let this value be called g and the observed difference of elevation $\Delta h'$. Then the difference in dynamic numbers is $\frac{\Delta h' g}{g_{45}}$.

A similar process, using theoretical instead of observed gravity, could be used to carry the dynamic number from one point to another without the intervention of orthometric elevations. For this purpose, if g now represents theoretical gravity the formula can be written $\frac{g}{g_{45}} \Delta h' = \Delta h' - (D_1 + kh) \Delta h'$. The last term serves as a correction to the observed $\Delta h'$ to obtain the difference in the dynamic numbers. The value (approximate) of k is $\frac{3147}{10^{10}}$. (See p. 51.)

But should the law of variation of gravity with elevation and latitude not be known, and the orthometric elevation of a point be desired with only observed values of gravity available, its dynamic number must first be found, then both the distance and gravity must be measured along the vertical into the earth to the surface of the geoid, the dynamic number being derived at each step. The dynamic number zero marks the surface of the geoid, and the distance between the given point and the point on the surface whose dynamic number is zero is the orthometric elevation of the former

TABLE 1.—*Orthometric and dynamic corrections.*

[For explanation of the use of the tables, see p. 52.]

C is expressed in units of the ninth decimal place. D_1 is expressed in units of the sixth decimal place. -10 is to be understood with $\log C$ and $\log D_1$. In south latitudes, if ϕ is taken negative, C is negative. The sign of D_1 is independent of the sign of the latitude.]

Latitude ϕ .	C .	$\log C$.	D_1 .	$\log D_1$.	Latitude ϕ .	C .	$\log C$.	D_1 .	$\log D_1$.
0 00	0	$-\infty$	+2637	7.4211	15 00	+767	3.8850	+2285	7.3588
10	+19	1.9506	+2637	7.4211	10	+775	3.8893	+2277	7.3573
20	+18	2.2516	+2637	7.4211	20	+783	3.8936	+2269	7.3558
30	+27	2.4277	+2637	7.4210	30	+790	3.8979	+2261	7.3543
40	+36	2.5526	+2636	7.4210	40	+798	3.9020	+2253	7.3528
50	+45	2.6495	+2636	7.4209	50	+806	3.9062	+2245	7.3513
1 00	+54	2.7287	+2635	7.4208	16 00	+813	3.9102	+2237	7.3497
10	+62	2.7956	+2635	7.4208	10	+821	3.9143	+2229	7.3481
20	+71	2.8536	+2634	7.4206	20	+828	3.9182	+2221	7.3465
30	+80	2.9047	+2633	7.4205	30	+836	3.9222	+2213	7.3449
40	+89	2.9504	+2633	7.4204	40	+843	3.9260	+2204	7.3432
50	+98	2.9917	+2632	7.4202	50	+851	3.9299	+2196	7.3416
2 00	+107	3.0295	+2631	7.4201	17 00	+858	3.9336	+2187	7.3399
10	+116	3.0642	+2629	7.4199	10	+866	3.9374	+2179	7.3382
20	+125	3.0963	+2628	7.4197	20	+873	3.9410	+2170	7.3364
30	+134	3.1262	+2627	7.4195	30	+880	3.9447	+2161	7.3347
40	+143	3.1541	+2626	7.4192	40	+888	3.9483	+2152	7.3329
50	+151	3.1804	+2624	7.4190	50	+895	3.9518	+2143	7.3311
3 00	+160	3.2051	+2623	7.4187	18 00	+902	3.9553	+2134	7.3293
10	+169	3.2285	+2621	7.4185	10	+909	3.9588	+2125	7.3274
20	+178	3.2507	+2619	7.4182	20	+917	3.9622	+2116	7.3256
30	+187	3.2718	+2617	7.4179	30	+924	3.9656	+2107	7.3237
40	+196	3.2919	+2615	7.4176	40	+931	3.9689	+2098	7.3218
50	+205	3.3111	+2614	7.4172	50	+938	3.9722	+2089	7.3198
4 00	+214	3.3294	+2611	7.4169	19 00	+945	3.9755	+2079	7.3179
10	+222	3.3470	+2609	7.4165	10	+952	3.9787	+2070	7.3159
20	+231	3.3640	+2607	7.4161	20	+959	3.9819	+2060	7.3139
30	+240	3.3802	+2605	7.4157	30	+966	3.9850	+2051	7.3119
40	+249	3.3959	+2602	7.4153	40	+973	3.9881	+2041	7.3098
50	+258	3.4110	+2600	7.4149	50	+980	3.9912	+2031	7.3077
5 00	+266	3.4256	+2597	7.4145	20 00	+987	3.9942	+2021	7.3056
10	+275	3.4396	+2594	7.4140	10	+994	3.9972	+2011	7.3035
20	+284	3.4533	+2592	7.4136	20	+1000	4.0002	+2001	7.3014
30	+293	3.4665	+2589	7.4131	30	+1007	4.0031	+1991	7.2992
40	+302	3.4793	+2586	7.4126	40	+1014	4.0060	+1981	7.2970
50	+310	3.4917	+2583	7.4121	50	+1021	4.0088	+1971	7.2947
6 00	+319	3.5038	+2580	7.4115	21 00	+1027	4.0117	+1961	7.2925
10	+328	3.5155	+2576	7.4110	10	+1034	4.0145	+1951	7.2902
20	+336	3.5269	+2573	7.4104	20	+1040	4.0172	+1940	7.2879
30	+345	3.5380	+2570	7.4099	30	+1047	4.0200	+1930	7.2855
40	+354	3.5488	+2566	7.4093	40	+1054	4.0227	+1919	7.2832
50	+362	3.5593	+2563	7.4087	50	+1060	4.0253	+1909	7.2808
7 00	+371	3.5696	+2559	7.4080	22 00	+1066	4.0280	+1898	7.2784
10	+380	3.5796	+2555	7.4074	10	+1073	4.0306	+1888	7.2759
20	+388	3.5894	+2551	7.4068	20	+1079	4.0331	+1877	7.2734
30	+397	3.5989	+2547	7.4061	30	+1086	4.0357	+1866	7.2709
40	+406	3.6082	+2543	7.4054	40	+1092	4.0382	+1855	7.2684
50	+414	3.6173	+2539	7.4047	50	+1098	4.0407	+1844	7.2658
8 00	+423	3.6262	+2535	7.4040	23 00	+1104	4.0432	+1833	7.2632
10	+431	3.6350	+2531	7.4033	10	+1111	4.0456	+1822	7.2606
20	+440	3.6435	+2526	7.4025	20	+1117	4.0480	+1811	7.2579
30	+449	3.6519	+2522	7.4018	30	+1123	4.0504	+1800	7.2553
40	+457	3.6600	+2518	7.4010	40	+1129	4.0527	+1789	7.2525
50	+466	3.6680	+2513	7.4002	50	+1135	4.0550	+1777	7.2498
9 00	+474	3.6759	+2508	7.3994	24 00	+1141	4.0573	+1766	7.2470
10	+483	3.6836	+2503	7.3985	10	+1147	4.0596	+1755	7.2442
20	+491	3.6912	+2499	7.3977	20	+1153	4.0618	+1743	7.2413
30	+500	3.6986	+2494	7.3968	30	+1159	4.0640	+1732	7.2384
40	+508	3.7058	+2489	7.3960	40	+1165	4.0662	+1720	7.2355
50	+516	3.7130	+2484	7.3951	50	+1171	4.0684	+1708	7.2326
10 00	+525	3.7200	+2478	7.3942	25 00	+1176	4.0705	+1697	7.2296
10	+533	3.7269	+2473	7.3932	10	+1182	4.0726	+1685	7.2266
20	+542	3.7336	+2468	7.3923	20	+1188	4.0747	+1673	7.2235
30	+550	3.7403	+2462	7.3913	30	+1193	4.0768	+1661	7.2204
40	+558	3.7468	+2457	7.3904	40	+1199	4.0788	+1649	7.2173
50	+567	3.7532	+2451	7.3894	50	+1205	4.0808	+1637	7.2141
11 00	+575	3.7595	+2445	7.3884	26 00	+1210	4.0828	+1625	7.2109
10	+583	3.7657	+2440	7.3873	10	+1216	4.0848	+1613	7.2076
20	+591	3.7718	+2434	7.3863	20	+1221	4.0868	+1601	7.2044
30	+600	3.7778	+2428	7.3852	30	+1227	4.0887	+1589	7.2010
40	+608	3.7837	+2422	7.3841	40	+1232	4.0906	+1576	7.1977
50	+616	3.7896	+2416	7.3831	50	+1237	4.0924	+1564	7.1943
12 00	+624	3.7953	+2410	7.3819	27 00	+1243	4.0943	+1552	7.1908
10	+632	3.8009	+2403	7.3808	10	+1248	4.0961	+1539	7.1873
20	+640	3.8065	+2397	7.3797	20	+1253	4.0979	+1527	7.1838
30	+649	3.8119	+2391	7.3785	30	+1258	4.0997	+1514	7.1802
40	+657	3.8173	+2384	7.3773	40	+1263	4.1015	+1502	7.1766
50	+665	3.8226	+2377	7.3761	50	+1268	4.1032	+1489	7.1729
13 00	+673	3.8278	+2371	7.3749	28 00	+1273	4.1049	+1476	7.1692
10	+681	3.8330	+2364	7.3736	10	+1278	4.1066	+1464	7.1654
20	+689	3.8380	+2357	7.3724	20	+1283	4.1083	+1451	7.1616
30	+697	3.8430	+2350	7.3711	30	+1288	4.1100	+1438	7.1577
40	+705	3.8480	+2343	7.3698	40	+1293	4.1116	+1425	7.1538
50	+713	3.8528	+2336	7.3685	50	+1298	4.1132	+1412	7.1499
14 00	+720	3.8576	+2329	7.3672	29 00	+1303	4.1148	+1399	7.1459
10	+728	3.8623	+2322	7.3658	10	+1307	4.1164	+1386	7.1418
20	+736	3.8670	+2315	7.3645	20	+1312	4.1180	+1373	7.1377
30	+744	3.8716	+2307	7.3631	30	+1317	4.1195	+1360	7.1335
40	+752	3.8761	+2300	7.3617	40	+1321	4.1210	+1347	7.1293
50	+760	3.8806	+2292	7.3602	50	+1326	4.1225	+1334	7.1250

TABLE 1.—*Orthometric and dynamic corrections—Continued.*

[C is expressed in units of the ninth decimal place. D_1 is expressed in units of the sixth decimal place. -10 is to be understood with $\log C$ and $\log D_1$. In south latitudes, if ϕ is taken negative, C is negative. The sign of D_1 is independent of the sign of the latitude.]

Latitude ϕ .	C .	$\log C$.	D_1 .	$\log D_1$.	Latitude	C .	$\log C$.	D_1 .	$\log D_1$.
30 00	+1330	4.1240	+1320	7.1207	45 00	+1538	4.1870	00	—∞
10	+1335	4.1254	+1307	7.1163	10	+1538	4.1870	— 15	5.1870 _a
20	+1339	4.1269	+1294	7.1118	20	+1538	4.1870	— 31	5.4880 _a
30	+1344	4.1283	+1280	7.1073	30	+1538	4.1870	— 46	5.6641 _a
40	+1348	4.1297	+1267	7.1027	40	+1538	4.1869	— 62	5.7891 _a
50	+1352	4.1311	+1253	7.0980	50	+1538	4.1869	— 77	5.8860 _a
31 00	+1356	4.1324	+1240	7.0933	46 00	+1537	4.1868	— 92	5.9651 _a
10	+1361	4.1338	+1226	7.0886	10	+1537	4.1867	— 108	6.0320 _a
20	+1365	4.1351	+1213	7.0837	20	+1537	4.1866	— 123	6.0900 _a
30	+1369	4.1364	+1199	7.0788	30	+1536	4.1865	— 138	6.1411 _a
40	+1373	4.1377	+1185	7.0738	40	+1536	4.1864	— 154	6.1868 _a
50	+1377	4.1389	+1171	7.0687	50	+1535	4.1862	— 169	6.2282 _a
32 00	+1381	4.1402	+1158	7.0636	47 00	+1535	4.1860	— 184	6.2659 _a
10	+1385	4.1414	+1144	7.0584	10	+1534	4.1859	— 200	6.3006 _a
20	+1389	4.1426	+1130	7.0531	20	+1533	4.1857	— 215	6.3328 _a
30	+1393	4.1438	+1116	7.0477	30	+1533	4.1855	— 230	6.3627 _a
40	+1396	4.1450	+1102	7.0423	40	+1532	4.1852	— 246	6.3906 _a
50	+1400	4.1461	+1088	7.0367	50	+1531	4.1850	— 261	6.4169 _a
33 00	+1404	4.1473	+1074	7.0311	48 00	+1530	4.1848	— 276	6.4416 _a
10	+1407	4.1484	+1060	7.0254	10	+1529	4.1845	— 292	6.4650 _a
20	+1411	4.1496	+1046	7.0196	20	+1528	4.1842	— 307	6.4872 _a
30	+1414	4.1506	+1032	7.0137	30	+1527	4.1839	— 322	6.5083 _a
40	+1418	4.1517	+1018	7.0077	40	+1526	4.1836	— 338	6.5284 _a
50	+1421	4.1527	+1004	7.0016	50	+1525	4.1833	— 353	6.5476 _a
34 00	+1425	4.1538	+989	6.9954	49 00	+1524	4.1829	— 368	6.5660 _a
10	+1428	4.1548	+975	6.9891	10	+1523	4.1826	— 383	6.5836 _a
20	+1431	4.1558	+961	6.9827	20	+1521	4.1822	— 399	6.6005 _a
30	+1435	4.1568	+947	6.9762	30	+1520	4.1818	— 414	6.6168 _a
40	+1438	4.1577	+932	6.9695	40	+1519	4.1814	— 429	6.6324 _a
50	+1441	4.1587	+918	6.9628	50	+1517	4.1810	— 444	6.6475 _a
35 00	+1444	4.1596	+903	6.9559	50 00	+1516	4.1806	— 459	6.6621 _a
10	+1447	4.1605	+889	6.9489	10	+1514	4.1801	— 474	6.6762 _a
20	+1450	4.1614	+875	6.9418	20	+1512	4.1797	— 490	6.6899 _a
30	+1453	4.1623	+860	6.9345	30	+1511	4.1792	— 505	6.7031 _a
40	+1456	4.1632	+846	6.9271	40	+1509	4.1787	— 520	6.7159 _a
50	+1459	4.1640	+831	6.9196	50	+1507	4.1782	— 535	6.7283 _a
36 00	+1462	4.1649	+816	6.9119	51 00	+1505	4.1777	— 550	6.7404 _a
10	+1464	4.1657	+802	6.9040	10	+1504	4.1771	— 565	6.7521 _a
20	+1467	4.1665	+787	6.8960	20	+1502	4.1766	— 580	6.7635 _a
30	+1470	4.1673	+772	6.8879	30	+1500	4.1760	— 595	6.7746 _a
40	+1472	4.1680	+758	6.8795	40	+1498	4.1754	— 610	6.7854 _a
50	+1475	4.1688	+743	6.8710	50	+1496	4.1748	— 625	6.7959 _a
37 00	+1478	4.1695	+728	6.8623	52 00	+1493	4.1742	— 640	6.8062 _a
10	+1480	4.1703	+713	6.8534	10	+1491	4.1736	— 655	6.8162 _a
20	+1482	4.1710	+699	6.8443	20	+1489	4.1729	— 670	6.8260 _a
30	+1485	4.1717	+684	6.8350	30	+1487	4.1723	— 685	6.8356 _a
40	+1487	4.1723	+669	6.8254	40	+1485	4.1716	— 700	6.8449 _a
50	+1489	4.1730	+654	6.8157	50	+1482	4.1709	— 715	6.8540 _a
38 00	+1492	4.1736	+639	6.8057	53 00	+1480	4.1702	— 729	6.8629 _a
10	+1494	4.1743	+624	6.7954	10	+1477	4.1695	— 744	6.8716 _a
20	+1496	4.1749	+609	6.7849	20	+1475	4.1687	— 759	6.8802 _a
30	+1498	4.1755	+594	6.7741	30	+1472	4.1680	— 774	6.8885 _a
40	+1500	4.1761	+579	6.7630	40	+1470	4.1672	— 788	6.8967 _a
50	+1502	4.1766	+564	6.7516	50	+1467	4.1664	— 803	6.9047 _a
39 00	+1504	4.1772	+549	6.7399	54 00	+1464	4.1656	— 818	6.9126 _a
10	+1506	4.1777	+534	6.7278	10	+1461	4.1648	— 832	6.9203 _a
20	+1507	4.1782	+519	6.7154	20	+1459	4.1639	— 847	6.9279 _a
30	+1509	4.1787	+504	6.7026	30	+1456	4.1631	— 862	6.9353 _a
40	+1511	4.1792	+489	6.6894	40	+1453	4.1622	— 876	6.9426 _a
50	+1513	4.1797	+474	6.6758	50	+1450	4.1613	— 891	6.9497 _a
40 00	+1514	4.1802	+459	6.6617	55 00	+1447	4.1604	— 905	6.9567 _a
10	+1516	4.1806	+444	6.6472	10	+1444	4.1595	— 920	6.9636 _a
20	+1517	4.1810	+429	6.6321	20	+1441	4.1585	— 934	6.9704 _a
30	+1519	4.1815	+413	6.6164	30	+1437	4.1576	— 948	6.9770 _a
40	+1520	4.1819	+398	6.6002	40	+1434	4.1566	— 963	6.9835 _a
50	+1521	4.1822	+383	6.5833	50	+1431	4.1556	— 977	6.9900 _a
41 00	+1523	4.1826	+368	6.5657	56 00	+1428	4.1546	— 991	6.9963 _a
10	+1524	4.1830	+353	6.5473	10	+1424	4.1536	— 1006	7.0025 _a
20	+1525	4.1833	+337	6.5281	20	+1421	4.1526	— 1020	7.0086 _a
30	+1526	4.1836	+322	6.5080	30	+1417	4.1515	— 1034	7.0146 _a
40	+1527	4.1839	+307	6.4869	40	+1414	4.1504	— 1048	7.0205 _a
50	+1528	4.1842	+292	6.4648	50	+1410	4.1493	— 1062	7.0263 _a
42 00	+1529	4.1845	+276	6.4414	57 00	+1407	4.1482	— 1077	7.0320 _a
10	+1530	4.1848	+261	6.4166	10	+1403	4.1471	— 1091	7.0377 _a
20	+1531	4.1850	+246	6.3904	20	+1399	4.1459	— 1105	7.0432 _a
30	+1532	4.1853	+230	6.3625	30	+1396	4.1448	— 1119	7.0487 _a
40	+1533	4.1855	+215	6.3326	40	+1392	4.1436	— 1133	7.0541 _a
50	+1534	4.1857	+200	6.3005	50	+1388	4.1424	— 1147	7.0594 _a
43 00	+1534	4.1859	+184	6.2658	58 00	+1384	4.1412	— 1160	7.0646 _a
10	+1535	4.1861	+169	6.2280	10	+1380	4.1399	— 1174	7.0698 _a
20	+1535	4.1862	+154	6.1867	20	+1376	4.1387	— 1188	7.0748 _a
30	+1536	4.1864	+138	6.1410	30	+1372	4.1374	— 1202	7.0798 _a
40	+1536	4.1865	+123	6.0899	40	+1368	4.1361	— 1216	7.0848 _a
50	+1537	4.1866	+108	6.0319	50	+1364	4.1348	— 1229	7.0896 _a
44 00	+1537	4.1867	+92	5.9650	59 00	+1360	4.1335	— 1243	7.0944 _a
10	+1537	4.1868	+77	5.8859	10	+1356	4.1321	— 1256	7.0991 _a
20	+1538	4.1869	+62	5.7890	20	+1351	4.1308	— 1270	7.1038 _a
30	+1538	4.1869	+46	5.6641	30	+1347	4.1294	— 1283	7.1084 _a
40	+1538	4.1870	+31	5.4880	40	+1343	4.1280	— 1297	7.1129 _a
50	+1538	4.1870	+15	5.1870	50	+1338	4.1266	— 1310	7.1174 _a

TABLE 1.—*Orthometric and dynamic corrections—Continued.*

[C is expressed in units of the ninth decimal place. D_1 is expressed in units of the sixth decimal place. -10 is to be understood with $\log C$ and $\log D_1$. In south latitudes, if ϕ is taken negative, C is negative. The sign of D_1 is independent of the sign of the latitude.]

Latitude ϕ .	C .	$\log C$.	D_1 .	$\log D_1$.	Latitude	C .	$\log C$.	D_1 .	$\log D_1$.
60 00	+1334	4.1251	-1324	7.1218 _n	66 10	+1139	4.0566	-1784	7.2513 _n
10	+1329	4.1237	-1337	7.1262 _n	20	+1133	4.0543	-1795	7.2541 _n
20	+1325	4.1222	-1350	7.1305 _n	30	+1127	4.0519	-1806	7.2568 _n
30	+1320	4.1207	-1364	7.1347 _n	40	+1121	4.0496	-1818	7.2595 _n
40	+1316	4.1192	-1377	7.1389 _n	50	+1115	4.0472	-1829	7.2622 _n
50	+1311	4.1176	-1390	7.1430 _n	67 00	+1109	4.0448	-1840	7.2648 _n
61 00	+1306	4.1160	-1403	7.1471 _n	10	+1102	4.0423	-1851	7.2674 _n
10	+1302	4.1145	-1416	7.1511 _n	20	+1096	4.0398	-1862	7.2700 _n
20	+1297	4.1129	-1429	7.1551 _n	30	+1090	4.0373	-1873	7.2726 _n
30	+1292	4.1112	-1442	7.1590 _n	40	+1083	4.0348	-1884	7.2751 _n
40	+1287	4.1096	-1455	7.1629 _n	50	+1077	4.0322	-1895	7.2776 _n
50	+1282	4.1079	-1468	7.1667 _n	68 00	+1071	4.0296	-1906	7.2800 _n
62 00	+1277	4.1062	-1481	7.1705 _n	10	+1064	4.0270	-1916	7.2825 _n
10	+1272	4.1045	-1493	7.1742 _n	20	+1058	4.0243	-1927	7.2849 _n
20	+1267	4.1028	-1506	7.1779 _n	30	+1051	4.0216	-1937	7.2872 _n
30	+1262	4.1010	-1519	7.1815 _n	40	+1045	4.0189	-1948	7.2896 _n
40	+1257	4.0993	-1531	7.1851 _n	50	+1038	4.0162	-1958	7.2919 _n
50	+1252	4.0975	-1544	7.1887 _n	69 00	+1031	4.0134	-1969	7.2942 _n
63 00	+1246	4.0957	-1557	7.1922 _n	10	+1025	4.0106	-1979	7.2965 _n
10	+1241	4.0938	-1569	7.1956 _n	20	+1018	4.0077	-1989	7.2987 _n
20	+1236	4.0919	-1581	7.1990 _n	30	+1011	4.0048	-1999	7.3009 _n
30	+1230	4.0901	-1594	7.2024 _n	40	+1004	4.0019	-2010	7.3031 _n
40	+1225	4.0881	-1606	7.2058 _n	50	+999	3.9990	-2020	7.3053 _n
50	+1220	4.0862	-1618	7.2091 _n	70 00	+991	3.9960	-2030	7.3074 _n
64 00	+1214	4.0843	-1630	7.2123 _n	10	+984	3.9929	-2039	7.3095 _n
10	+1209	4.0823	-1643	7.2155 _n	20	+977	3.9899	-2049	7.3116 _n
20	+1203	4.0803	-1655	7.2187 _n	30	+970	3.9868	-2059	7.3137 _n
30	+1197	4.0782	-1667	7.2219 _n	40	+963	3.9836	-2069	7.3157 _n
40	+1192	4.0762	-1679	7.2250 _n	50	+956	3.9805	-2078	7.3177 _n
50	+1186	4.0741	-1691	7.2280 _n	71 00	+949	3.9773	-2088	7.3197 _n
65 00	+1180	4.0720	-1702	7.2311 _n	10	+942	3.9740	-2097	7.3217 _n
10	+1175	4.0699	-1714	7.2341 _n	20	+935	3.9707	-2107	7.3236 _n
20	+1169	4.0677	-1726	7.2370 _n	30	+928	3.9674	-2116	7.3255 _n
30	+1163	4.0656	-1738	7.2400 _n	40	+921	3.9640	-2125	7.3274 _n
40	+1157	4.0633	-1749	7.2429 _n	50	+913	3.9606	-2134	7.3293 _n
50	+1151	4.0611	-1761	7.2457 _n	72 00	+906	3.9572	-2144	7.3311 _n
66 00	+1145	4.0589	-1772	7.2485 _n					

TABLE 2.—*Giving D_2 in units of the tenth decimal place.*

[See p. 53. D_2 is always positive.]

ϕ \ h	0 meter.	1000 meters.	2000 meters.	3000 meters.	4000 meters.	5000 meters.
0	1575	1574	1574	1574	1574	1573
10	1575	1574	1574	1574	1574	1573
20	1574	1574	1574	1574	1573	1573
30	1574	1574	1574	1573	1573	1573
40	1574	1573	1573	1573	1573	1572
50	1573	1573	1573	1573	1572	1572
60	1573	1573	1572	1572	1572	1572
70	1573	1572	1572	1572	1572	1572
80	1572	1572	1572	1572	1572	1571
90	1572	1572	1572	1572	1571	1571

TABLE 2a.—*Giving $\log D_2$. -10 is to be supplied as part of the characteristic.*

[See p. 53. D_2 is always positive.]

ϕ \ h	0 meter.	1000 meters.	2000 meters.	3000 meters.	4000 meters.	5000 meters.
0	3.1972	3.1971	3.1970	3.1970	3.1969	3.1968
10	.1971	.1971	.1970	.1970	.1969	.1968
20	.1971	.1970	.1970	.1969	.1968	.1968
30	.1970	.1970	.1969	.1968	.1968	.1967
40	.1969	.1969	.1968	.1967	.1966	.1966
50	.1968	.1968	.1967	.1966	.1965	.1965
60	.1967	.1966	.1966	.1965	.1965	.1964
70	.1966	.1966	.1965	.1964	.1964	.1963
80	.1966	.1965	.1965	.1964	.1963	.1962
90	3.1966	3.1965	3.1964	3.1964	3.1963	3.1962

METHODS OF OBTAINING THEORETICALLY BEST ORTHOMETRIC ELEVATIONS.

In the table on pages 81-82 there is given the theoretically best orthometric elevation of each junction point of the precise level net. In the table on pages 83-84 there are given the theoretically best elevation and the dynamic number for each junction point in the precise level net and for a few other bench marks at the highest and the lowest points of some lines and at points where the grade changes suddenly.

There are shown below the methods which may be used to obtain the theoretically best orthometric elevation of any other bench mark in the precise level net for which the standard elevation is given, it being assumed that in each case there are known the distances of the bench mark in question from the two junction points between which it lies and also the theoretically best orthometric elevations of those junction points.

Two cases are to be considered, according to whether or not the orthometric correction has been applied to the standard elevations. The simpler case, in which the orthometric correction has been applied to the standard elevations, is considered first.

Let h_1 and h_2 be the known standard elevations of the two junction points, P_1 and P_2 , between which lies the point P whose theoretically best orthometric elevation is desired. If the bench mark in question is on a spur line, the point P should be taken at the base of the spur, since, in this first case, all points on the spur will receive the same correction.

Let h , h_1 , and h_2 be the theoretically best orthometric elevations of P , P_1 , and P_2 , respectively.

Let $c = h - h$, $c_1 = h_1 - h_1$, and $c_2 = h_2 - h_2$ be the corrections to the standard elevations necessary to make them the theoretically best orthometric elevations. By assumption c_1 and c_2 are known and c is desired.

Let d_1 and d_2 represent the distances of P from P_1 and P_2 along the line of levels, both taken as positive, regardless of direction. (If the bench mark is on a spur line, d_1 and d_2 should be measured to the base of the spur only.) Where a line of levels follows a railroad, the distances from the bench mark and the junction points may be obtained from a railroad time-table. Where the line of levels does not follow a railroad, the distances may be scaled from any reliable topographic map. For bench marks of the Coast and Geodetic Survey it is best to use the distances as published in the direct results of leveling. (For references to sources, see pp. 59-71.)

The formula for c , the desired correction, is—

$$\left. \begin{array}{l} c = c_1 + \frac{c_2 - c_1 d_1}{d_1 + d_2} \\ \text{or} \quad c = c_2 + \frac{c_1 - c_2 d_2}{d_1 + d_2} \\ \text{or} \quad c = \frac{c_1 d_2 + c_2 d_1}{d_1 + d_2} \end{array} \right\} \quad (1)$$

Either the first or the second form of (1) will be more convenient than the third when there are many elevations to be computed between any two junction points.

If the orthometric correction has not been applied to the standard elevations, the formula is more complicated. In this case it is necessary to compute the orthometric correction to the observed difference of elevation between P and P_1 and between P and P_2 .

Let k_1 represent the orthometric correction to the quantity $h - h_1$, that is, the correction to the observed difference of elevation necessary to carry orthometric elevations from P_1 to P ; let k_2 represent the orthometric correction to the quantity $h - h_2$, that is, the correction needed to carry orthometric elevations from P_2 to P ; then $k = k_1 - k_2$, the orthometric correction to the quantity $h_2 - h_1$.

These orthometric corrections may be computed from the approximate elevations of points along the line of levels by the formulas and tables on pages 51-56. No details of the orthometric correction for Coast and Geodetic Survey lines of levels have yet been published.

The formula for c , the desired correction, is—

$$\left. \begin{aligned} c &= c_1 + \frac{c_2 - c_1 - k}{d_1 + d_2} d_1 + k_1 \\ \text{or} \quad c &= c_2 + \frac{c_1 - c_2 + k}{d_1 + d_2} d_2 + k_2 \\ \text{or} \quad c &= \frac{(c_1 + k_1)d_2 + (c_2 + k_2)d_1}{d_1 + d_2} \end{aligned} \right\} \quad (2)$$

Either the first or the second form of (2) will be more convenient than the third when there are many elevations between the two junction points to be computed, since the fraction which multiplies d_1 or d_2 is constant between any two junction points. If P is on a spur, k_1 and k_2 (also d_1 and d_2 as mentioned before) are to be taken to the base of the spur only; for a long spur the additional correction needed to carry orthometric elevations from the base of the spur to the point in question should be applied.

The following examples will illustrate the above formulas. For each of the two bench marks used in the examples, the theoretically best elevations are shown in the table on pages 83-84. It should be borne in mind that the standard elevations contain the orthometric correction only for bench marks west of the imaginary line connecting those junction points in the Mississippi Valley named on page 74.

(1) To find the theoretically best orthometric elevation of U.S.G.S. 7273, assumed to be P , near Riordan, Ariz. Riordan is on the line between the junction points Goffs L_5 , which may be taken as P_1 , and Belen U.S.G.S. 4793, assumed to be P_2 . The respective distances d_1 and d_2 are 416 and 574 kilometers. (See pp. 42, 43, and 48.) From the table on page 82 it is found for Goffs that $c_1 = 786.7842 - 786.7998 = -0.0156$ meter and for Belen $c_2 = 1461.2611 - 1461.2516 = +0.0095$ meter. Then since the orthometric correction has already been applied to the standard elevation at Riordan, equation (1) is to be used, giving—

$$c = \frac{-0.0156 \times 574 + 0.0195 \times 416}{990} = -0.0051 \text{ meter.}$$

This, added to the standard elevation, 2216.5503 meters,* gives 2216.5452 meters, as shown in the table on page 84.

(2) To find the elevation of Q at Swarengin, Ala., on the basis of the general adjustment. This bench mark is on a spur which branches off from the main line at bench mark J_2 at Woodville, Ala., between Chattanooga, Tenn., and Decatur, Ala. (See Appendix 3, Report for 1903, p. 246.) Taking Woodville J_2 as P , Chattanooga 698 N as P_1 , and Decatur P.B.M. 50 as P_2 , it is found that $d_1 = 116$ kilometers and $d_2 = 80$ kilometers. From this publication, p. 81, it is found that—

$$c_1 = 211.2396 - 211.1690 = +0.0706 \text{ meter.}$$

$$c_2 = 169.6716 - 169.5959 = +0.0757 \text{ meter.}$$

From computations not published in detail, $k_1 = +0.0071$ meter, $k_2 = -0.0005$ meter, giving $k = +0.0076$ meter, as published on page 84.

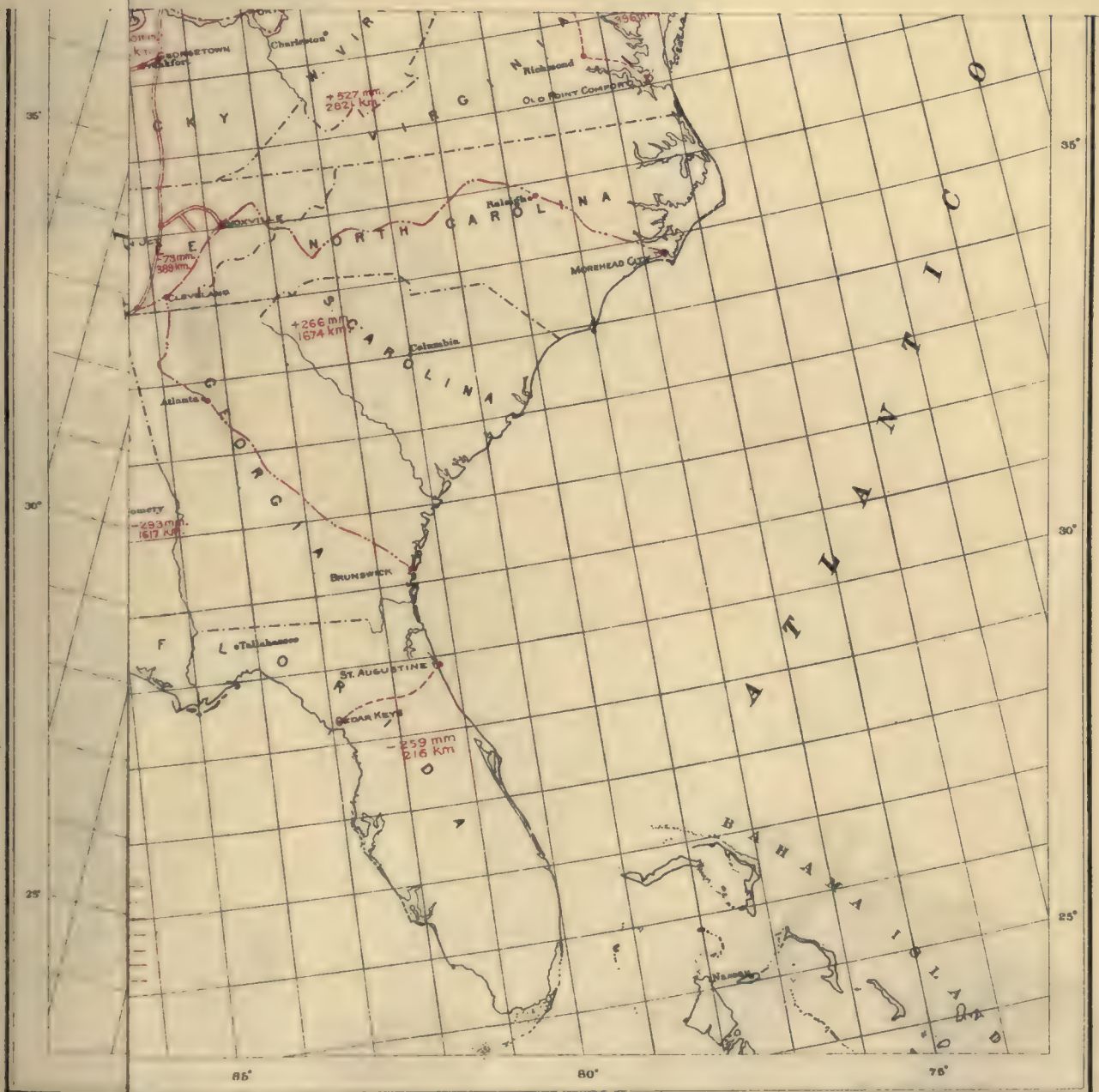
Then—

$$c = \frac{(0.0706 + 0.0071) \times 80 + (0.0757 - 0.0005) \times 116}{196} = +0.0762 \text{ meter.}$$

There is an additional orthometric correction of $+0.0010$ meter to the leveling from J_2 to Q . The standard elevation of Q is 413.8715 meters.* After applying the two corrections given above to this elevation, there is obtained the elevation of Q on the 1912 general adjustment which equals 413.9487 meters, as is shown in the table on page 84.

The dynamic number for a bench mark may be computed by the methods described on pages 52 to 56.

* This is from the original computation. In publishing the standard elevation, the number of decimal places was reduced to three.



THE ADJUSTMENTS OF 1912.

CONDENSED STATEMENT OF DIRECT RESULTS OF OBSERVATION.

On the following pages are shown in condensed form for convenient reference the direct results of all the leveling which is included in the level net in this publication. All lines introduced into the net for the first time in this adjustment are indicated by italics.

The numbering of the lines repeated from Appendix 8, Report for 1899, Appendix 3, Report for 1903, and "Precise Leveling in the United States, 1903-1907," has been retained unchanged as far as possible.

For each long line of leveling there are stated in tabular form the location and designation of the terminal bench marks, the distance between them measured along the level line, the observed difference of elevation, and a reference to the authority from which these facts are obtained. A plus sign on the difference of elevation indicates that the first-named bench mark is higher than the second.

As the desirable information in regard to tide observations and the observations fixing the relations between certain bench marks which are common to two or more level lines at their junction points can not conveniently be put in this tabular form, it is placed immediately after it in paragraphs, which are numbered to correspond with the relation which they bear to the tabular matter. The numbers assigned in the tabulation and the following paragraphs serve also to indicate approximately the order in which the corrected elevations and descriptions of bench marks are given.

Another distinction may also be made between the paragraphic matter and the tabular matter. All elevations or relative elevations which are stated in the paragraphic matter are assumed to be determined by the observations with so high a degree of accuracy, as compared with the relative elevations stated in the tabular matter, that they are treated as fixed quantities in the adjustment, or, in other words, are assigned infinite weight.

The lines of leveling are also shown on Illustration No. 5. The lines have been drawn nearly in their true location, but the drawing has necessarily been somewhat generalized and in a few cases it has been necessary to exaggerate distances between points in order to make them show as separate points. The various symbols used in drawing the lines serve to show by what organizations they were run. "U. S. Engineer Precise Leveling" includes the precise leveling done under the direction of the Corps of Engineers, United States Army; the Mississippi River Commission, and the Missouri River Commission. "U. S. Engineer Wye Leveling" includes wye leveling done under the direction of the Corps of Engineers, United States Army, and the Board of Engineers on Deep Waterways.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		<i>km.</i>		<i>m.</i>	
2	Perth Amboy, N. J.	267	F.	-106.3911	C. and G. S. Rep. 1882, pp. 525-528.
	Harrisburg, Pa.		No. XXIX		
3	Harrisburg, Pa.	119	No. XXIX	- 59.5851	Ibid., 1882, pp. 528-529.
	Hagerstown, Md.		A		
4B	Cumberland, Md.	94	I.	+ 61.8102	Ibid., 1882, pp. 533-535.
	Hancock, Md.		F		
4C	Hancock, Md.	50	F	- 40.0451	Ibid., 1882, p. 533.
	Hagerstown, Md.		A		
4D	Grafton, W. Va.	48	M.	-191.1505	Ibid., 1882, p. 537.
	Amblersburg, W. Va.		L		
4E	Amblersburg, W. Va.	116	L.	+304.9094	Ibid., 1882, pp. 535-537.
	Cumberland, Md.		I		
7B	Olney, Ill.	85	B ₂	- 12.8461	Ibid., 1882, p. 552.
	Odin, Ill.		No. V		
7C	Lawrenceburg, Ind.	170	U.	- 61.4077	Ibid., 1882, pp. 547-550.
	Mitchell, Ind.		X		
7D	Mitchell, Ind.	107	X.	+ 78.2550	Ibid., 1882, pp. 550-556.
	Vincennes, Ind.		No. 1		
7E	Vincennes, Ind.	52	No. 1.	- 17.0756	Ibid., 1882, pp. 551-556.
	Olney, Ill.		B ₂		
8	Odin, Ill.	104	No. V.	+ 34.4398	Ibid., 1882, pp. 552-554.
	St. Louis, Mo.		K ₂		
9	St. Louis, Mo.*	205	K ₂	- 43.8058	Ibid., 1893, Pt. 2, pp. 23-32; 1896, p. 268.
	Jefferson City, Mo.		Old B. M. 90 (85)		

* This includes a local adjustment of two runnings between M₂ and No. XIV near New Haven and Etiah, Mo. (See C. and G. S. Rep. 1893, pp. 25, 28.)

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		m.	
11	Jefferson City, Mo.	198	No. XXVIII.	- 69.6683	C. and G. S. Rep. 1896, pp. 268-273.
	Pleasant Hill, Mo.		No. LI		
13	Kansas City, Mo.	45	No. LVIII.	- 32.0065	Ibid., 1896, pp. 273-275.
	Pleasant Hill, Mo.		No. LII		
15A	Kansas City, Mo.	23	Old M. R. C. B. M. 244	- 2.9290	Ibid., 1896, p. 275.
	Holliday, Kans.		No. LXII		
16	Holliday, Kans.	239	No. LXIII.	-120.1134	Ibid., 1897, pp. 273-278.
	Abilene, Kans.		B ₁		
20	Salina, Kans.	188	H ₁	-272.6940	Ibid., 1897-98, p. 190.
	Ellis, Kans.		A ₂		
22	Ellis, Kans.	372	B ₂	-391.8633	Ibid., 1897-98, pp. 201-209.
	Hugo, Colo.		K		
23	Hugo, Colo.	25	K.	- 93.8534	Ibid., 1897-98, p. 221.
	Limon, Colo.		N		
25	Limon, Colo.	123	P.	-214.1380	Ibid., 1897-98, pp. 221-224.
	Roswell, Colo.		Z		
26	Roswell, Colo.	121	Z.	+267.8229	Ibid., 1899, pp. 385-388.
	Denver, Colo.		Z ₁		
28	Limon, Colo.	141	N.	+ 46.4068	Ibid., 1899, pp. 389-392.
	Denver, Colo.		Z ₁		
30	Mobile, Ala.	93	E ₁	- 1.0250	Ibid., 1887, pp. 188-190.
	Ocean Springs, Miss.		C		
31	Meridian, Miss.	219	A	+101.1643	Ibid., 1888, pp. 411-417.
	Mobile, Ala.		V		
32	Corinth, Miss.	314	C	+ 32.3287	Ibid., 1888, pp. 418-422; 1892, Pt. 2, pp. 165-169.
	Meridian, Miss.		P. B. M. 1.	- 41.1591	Ibid., 1892, Pt. 2, pp. 160-181.
34	Cairo, Ill.	265	W	+ 19.7118	Ibid., 1892, Pt. 2, pp. 187-189.
36A	Odin, Ill.	71	No. V.	+ 43.3714	Ibid., 1892, Pt. 2, pp. 181-187.
	Duquoin, Ill.		R ₂		
36B	Duquoin, Ill.	123	P. B. M. 2	+ 12.1193	Ibid., 1888, pp. 443-450.
	Cairo, Ill.		Greenville No. 1.		
44	Greenville, Miss.	185	No. 211	+ 38.0703	Ibid., 1888, pp. 457-461.
	Vicksburg, Miss.		3 (or No. 1)		
46	Little Rock, Ark.	181	F	+ 46.1848	Ibid., 1888, pp. 461-462; 1899, pp. 362-368.
	Arkansas City, Ark.		No. XXXVIII.		
48	Van Buren, Ark.	261	3 (or No. 1)	- 10.1563	Ibid., 1899, p. 368.
	Little Rock, Ark.		No. XXXIX		
50	Van Buren, Ark.		No. XLI	+131.2299	Ibid., 1899, p. 369.
	Port Smith, Ark.		No. XLVIII.		
51	Chester, Ark.		No. XXXIX	+ 27.5842	Ibid., 1899, pp. 377-382.
	Van Buren, Ark.		No. XCVII.		
53	Boston, Mo.	252	No. XLIX	+ 25.8493	Ibid., 1899, pp. 373-376.
	Chester, Ark.		No. 43		
55	Harrisonville, Mo.	145	No. XCVI	- 48.3294	Ibid., 1899, p. 372.
	Boston, Mo.		No. LI		
56	Pleasant Hill, Mo.	13	No. 43	- 76.4558	Ibid., 1899, pp. 370-372.
	Harrisonville, Mo.		No. LXII.		
57A	Holliday, Kans.	75	No. 43	+158.4543	Ibid., 1896, pp. 257, 262-263.
	Harrisonville, Mo.		A.		
59A	Hagerstown, Md.	129	No. XI	- 18.0040	Ibid., 1896, p. 251.
	Georgetown, D. C.		No. XI.		
59B	Georgetown, D. C.	8	Capitol B. M.	- 49.1571	Ibid., 1896, pp. 248-255.
	Washington, D. C.		No. XI.	- 48.7652	
	Richmond, Va.		O	- 48.7652	
			U	- 48.7652	
61A	Richmond, Va.	185	O	+ 55.4865	Ibid., 1896, pp. 239-244.
	Old Point Comfort, Va.		U	- 48.7652	
				- 48.7652	
				- 48.7652	
63	Richmond, Va.	140	O	+ 55.4865	Ibid., 1896, pp. 239-244.
	Old Point Comfort, Va.		U	- 48.7652	
				- 48.7652	
				- 48.7652	
64	St. Augustine, Fla.	216	Sea level.	- 0.2585	Ibid., 1899, p. 397.
	Cedar Keys, Fla.		Sea level		
65	Meridian, Miss.	224	C.	+ 45.5885	Ibid., 1899, pp. 354-360.
	Vicksburg, Miss.		B. M. Cistern		
66	Corinth, Miss.	151	W.	+ 57.2388	Ibid., 1892, Pt. 2, pp. 207-219.
	Memphis, Tenn.		P. B. M. Memphis		
68	Annapolis, Md.	63	a.	- 26.3500	Ibid., 1889, p. 463.
	Washington, D. C.		Capitol B. M.		
70A	Norfolk, Nebr.	466	N ₁	+113.4466	Ibid., 1899, pp. 306-319.
	Abilene, Kans.		Y ₂		
72C	Gibraltar, Mich.	124	I (1898)	- 38.2539	Ibid., 1899, p. 340.
	Deshler, Ohio.		I ₁		
72D	Deshler, Ohio.	272	I ₁	+ 50.8004	Ibid., 1899, pp. 340-342.
	Cincinnati, Ohio.		T		
74A	Monroe, La.	140	P. B. M. 27	- 38.3101	Ch. of Eng. Rep. 1893, Pt. 3, pp. 1952-1953; 1902, Pt. 2, p. 1457.
	Bodcau, La.		P. B. M. 44		
74D	Shreveport, La.	315	P. B. M. 46	+ 35.4849	Ibid., 1902, Pt. 2, pp. 1457-1459.
	Barbin Landing, La.		T. B. M. 53		
74E	Barbin Landing, La.	67	T. B. M. 53	+ 9.3550	Ibid., 1902, Pt. 2, pp. 1459-1460.
	Smithland, La.		P. B. M. XLV		
76	Monroe, La.	34	P. B. M. 24	- 4.9980	Ibid., 1893, Pt. 3, pp. 1945-1946; 1902, Pt. 2, pp. 1456, 1457.
	Rayville, La.		P. B. M. 17		
78	Rayville, La.	79	P. B. M. 10	- 2.1750	Ch. of Eng. Rep. 1893, Pt. 3, p. 1945; 1902, Pt. 2, p. 1456.
	Vicksburg, Miss.		S. W. Base		
79	Concordia, La.	11	T. B. M. 9	- 0.1609	Ibid., 1902, Pt. 2, p. 1466.
	Vidalia, La.		LXIV		
80A	Monroe, La.	61	P. B. M. 27	+ 5.5998	Ibid., 1902, Pt. 2, p. 1450.
	Columbia, La.		T. B. M. 137		
80B	Columbia, La.	78	T. B. M. 137	+ 1.7178	Do.
	Jonesville, La.		P. B. M. 4		
80C	Jonesville, La.	29	P. B. M. 4	- 3.1422	Ibid., 1902, Pt. 2, p. 1466.
	Concordia, La.		T. B. M. 9		
81A	Rayville, La.	15	P. B. M. 17	+ 3.3802	Ibid., 1902, Pt. 2, p. 1463.
	Archibald, La.		P. B. M. Archibald		

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		m.	
81B	Archibald, La.....	95	P. B. M. Archibald.....	+ 3.8656	Ibid., 1902, Pt. 2, p. 1463.
	Concordia, La.....		T. B. M. 9.....		
83A	Jonesville, La.....	54	P. B. M. 4.....	+ 1.5342	Ibid., 1902, Pt. 2, pp. 1450-1451.
	Acme, La.....		P. B. M. 12a.....		
84	Shreveport, La.....	44	P. B. M. 46.....	- 0.4581	Ibid., 1902, Pt. 2, p. 1465.
	Jeters Landing, La.....		P. B. M. 4.....		
86	Parkeville, La.....	34	P. R. P. Parkeville.....	+ 1.7471	Ibid., 1902, Pt. 2, p. 1448.
	Monroe, La.....		P. B. M. 24.....		
87	Glendora, La.....	42	P. R. P. Glendora.....	- 4.7268	Ibid., 1902, Pt. 2, pp. 1455, 1456.
	Steins Bluff, La.....		P. B. M. Stein.....		
88A	Little Rock, Ark.....	186	3 (or No. 1).....	+ 45.2904	Ibid., 1902, Pt. 2, p. 1449.
	Camden, Ark.....		P. B. M. Camden IV.....		
88B	Camden, Ark.....	152	P. B. M. Camden IV.....	+ 11.5171	Ibid., 1902, Pt. 2, pp. 1448-1449.
	Parkeville, La.....		P. R. P. Parkeville.....		
89	Wilkersons Landing, Miss.....	163	P. B. M. 84.....	+ 17.4850	Ibid., 1902, Pt. 2, pp. 1454, 1455.
	Parkeville, La.....		T. B. M. 74.....		
90	Greenville, Miss.....	32	Greenville No. 1.....	- 2.3115	Ibid., 1883, Pt. 3, pp. 2183, 2184.
	Wilkersons Landing, Miss.....		P. B. M. 84.....		
91	Greenville, Miss.....	33	Greenville No. 1.....	- 2.3033	Ibid., 1902, Pt. 2, p. 1455.
	Wilkersons Landing, Miss.....		P. B. M. 84.....		
92	Vicksburg, Miss.....	269	P. B. M. 2.....	- 10.5820	Ibid., 1894, Pt. 3, pp. 1497-1499; 1902, Pt. 2, pp. 1460-1462.
	Greenville, Miss.....		Greenville No. 1.....		
93	Wilkersons Landing, Miss.....	153	P. B. M. 84.....	- 12.8985	Ibid., 1883, Pt. 3, pp. 2177-2183.
	Friar Point, Miss.....		P. B. M. Friar Point II.....		
94	Friar Point, Miss.....	32	P. B. M. Friar Point II.....	+ 2.5630	Ibid., 1902, Pt. 2, p. 1467.
	Clarksdale, Miss.....		P. B. M. Clarksdale III.....		
95	Friar Point, Miss.....	134	P. B. M. Friar Point II.....	- 25.3792	Ibid., 1879, Pt. 3, p. 1944; 1878, Pt. 3, p. 1392
	Memphis, Tenn.....		P. B. M. Memphis.....		
99	Riverton Junction, Ala.....	63	T. B. M. 44.....	- 1.1236	Ibid., 1896, Pt. 3, pp. 1999-2011.
	Pittsburgh Landing, Tenn.....		P. B. M. 61.....		
100	Meridian, Miss.....	42	C.....	+ 57.4130	Ibid., 1899, Pt. 2, pp. 1779-1781.
	York, Ala.....		P. B. M. 26.....		
101	York, Ala.....	207	P. B. M. 26.....	-138.5920	Ibid., 1899, Pt. 2, pp. 1770-1779.
	Birmingham, Ala.....		P. B. M. 1.....		
102	York, Ala.....	46	P. B. M. 26.....	+ 8.7319	Ibid., 1899, Pt. 2, pp. 1781-1783.
	Demopolis, Ala.....		P. B. M. 6.....		
103	Memphis, Tenn.....	330	P. B. M. Memphis.....	- 16.7198	Miss. Riv. Com. Rep. 1881, pp. 52-63; Ch. of Eng. Rep. 1883, Pt. 3, pp. 2187-2188.
	Cairo, Ill.....		P. B. M. 2.....		
104	Cairo, Ill.....	275	P. B. M. 1.....	- 29.2737	Ch. of Eng. Rep. 1884, Pt. 4, pp. 2480-2499.
	St. Louis, Mo.....		K.....		
105	St. Louis, Mo.....	21	K.....	- 13.3804	Ibid., 1884, Pt. 4, pp. 2479-2480; 1888, Pt. 4, p. 2328. (Mean of these two measures used.)
	12 miles above St. Louis, Mo.....		P. B. M. 12.....		
106A	12 miles above St. Louis, Mo.....	47	P. B. M. 12.....	+ 6.3495	Ibid., 1884, Pt. 4, pp. 2476-2479.
	Grafton, Ill.....		P. B. M. 3.....		
106B	Grafton, Ill.....	504	P. B. M. 3.....	- 49.2893	Ibid., 1884, Pt. 4, pp. 2499-2534.
	Albany, Ill.....		P. B. M. 53.....		
108	Albany, Ill.....	6	P. B. M. 53.....	+ 4.9232	Ibid., 1884, Pt. 4, p. 2534; 1885, Pt. 4, p. 2652 (Mean of these two measures used.)
	Fulton, Ill.....		P. B. M. 56.....		
110	Fulton, Ill.....	31	P. B. M. 56.....	- 2.9032	Ibid., 1885, Pt. 4, pp. 2652-2654.
	Savanna, Ill.....		P. B. M. 62.....		
112	Savanna, Ill.....	224	P. B. M. 62.....	+ 0.2105	Ibid., 1885, Pt. 4, pp. 2654-2669.
	Chicago, Ill.....		P. B. M. 99.....		
113	Savanna, Ill.....	478	P. B. M. 62.....	- 33.8437	Ibid., 1892, Pt. 4, pp. 2958-3037.
	St. Paul, Minn.....		P. B. M. 68.....		
116	St. Paul, Minn.....	250	P. B. M. 68.....	+ 23.1902	Ibid., 1892, Pt. 4, pp. 3074-3098.
	Duluth, Minn.....		B. M. 1 of U. S. Eng.....		
118	Marquette, Mich.....	105	1 (1871).....	+ 5.1567	Prof. Papers No. 24 (U. S. Lake Survey Rep.), pp. 603-604.
	Escanaba, Mich.....		1 (1874).....		
120	12 miles above St. Louis, Mo.....	224	P. B. M. 12.....	- 52.1251	Ch. of Eng. Rep. 1888, Pt. 4, p. 2323; 1893, Pt. 6, pp. 4046-4082.
	Jefferson City, Mo.....		XXVIII (Capitol).....		
121	Jefferson City, Mo.....	306	Old B. M. 90 (85).....	- 58.2482	Ibid., 1893, Pt. 6, pp. 3988-4045.
	Kansas City, Mo.....		LVIII.....		
122	Kansas City, Mo.....	113	Old M. R. C. B. M. 244.....	- 19.0180	Ibid., 1893, Pt. 6, pp. 3964-3988.
	St. Joseph, Mo.....		P. B. M. 287.....		
124	St. Joseph, Mo.....	366	P. B. M. 280.....	- 85.1170	Ibid., 1893, Pt. 6, pp. 4138-4208.
	Sioux City, Iowa.....		P. B. M. 399.....		
133A	Greenbush, N. Y.....	11	Gristmill.....	- 3.0162	C. and G. S. Rep. 1903, pp. 297, 298.
	Troy, N. Y.....		D. W. Troy 2.....		
133C	Troy, N. Y.....	106	N. Y. 12.....	- 25.1211*	Rep. on Deep Waterways 1900, Pt. II, pp. 1017, 1023, 1025.
	Whitehall, N. Y.....	(66 mi.)	U. S. C. S. 36.....	(- 82.418 ft.)	N. Y. State Eng. Rep. 1901, pp. 653, 671, 675.
133D	Whitehall, N. Y.....	■	U. S. C. S. 36.....	- 8.0071	Rep. on Deep Waterways 1900, Pt. II, pp. 1025-1026.
	Crown Point, N. Y.....	(37.2 mi.)	L. H.....	(- 26.27 ft.)	Ibid., Pt. I, pp. 393-398; Pt. II, p. 1026.
133E	Crown Point, N. Y.....	103	L. H.....	+ 8.4674	
	Coopersville, N. Y.....	(63.9 mi.)	D. W. Coopersville.....	(+ 27.78 ft.)	
133F	Coopersville, N. Y.....	126	D. W. Coopersville.....	- 23.2350	Ibid., Pt. II, pp. 1026-1029.
	Hogansburg, N. Y.....	(78.5 mi.)	P. B. M. P. Hogansburg.....	(- 76.24 ft.)	
133G	Hogansburg, N. Y.....	193	P. B. M. P. Hogansburg.....	- 26.0919	MS. furnished by Ch. of Eng., Mar., 1900.
	Tibbetts Pt., N. Y.....		P. B. M. 35.....		
133H	Tibbetts Pt., N. Y.....	73	A.....	- 3.6430	Ibid., Mar., 1903.
	Oswego, N. Y.....		P. B. M. 35.....		
135	Tibbetts Point, N. Y.....	320	Gristmill.....	+ 4.2898	Rep. Top. Surv. Mass., 1893.
	Greenbush, N. Y.....		Sea level.....	(+ 14.074 ft.)	
138A	Boston, Mass.....	76	598 D.....	-241.4932	MS. furnished by U. S. Geol. Surv., Feb., 1903.
	Salamanca, N. Y.....		1391 D.....		
138B	Salamanca, N. Y.....	131	1391 D.....	+ 75.9076	Do.
	Hornellsville, N. Y.....		1141 D.....		
138C	Hornellsville, N. Y.....	94	1141 D.....	+ 86.5039	Do.
	Elmira, N. Y.....		857 A.....		

* This result is a weighted mean. In combining, the Deep Waterways leveling was given twice as much weight as the New York State leveling. The weight assigned to the portion of the line Oswego-Greenbush is $\frac{750}{L}$ as it consists of three runnings instead of two. See page 628 of the State Engineer's Report.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		m.	
138D	Elmira, N. Y.	94	857 A.	- 2.2659	MS. furnished by U. S. Geol. Surv., Feb. 1903.
138E	Binghamton, N. Y.	60	867 A.	- 37.7005	Do.
138F	Bainbridge, N. Y.	168	989 A.	+243.4220	Do.
140B	Vischers Ferry, N. Y.	(104.6 mi.)	L. S. 18		
	Leboeuf, Pa.	36	1193 Pittsburgh, 1899.	+188.0081	Do.
	Erie, Pa.		L. H.		
140C	Franklin, Pa.	86	987 Pittsburgh, 1899.	- 62.8310	Do.
	Leboeuf, Pa.		1193 Pittsburgh, 1899.		
140D	West Penn Junction, Pa.	150	P. R. R. No. 26.	- 60.6127	Do.
	Franklin, Pa.		987 Pittsburgh, 1899.		
142B	Braddock, Pa.	201	P. R. R. No. 88.	- 17.1478	Do.
	Bentons Ferry, W. Va.		885 Pittsburgh.	(- 56.259 ft.)	
143A	Braddock, Pa.	70	P. R. R. No. 88.	- 88.7061	Pa. R. R. B. M. Book, pp. 71-74.
	Blairsville Intersec., Pa.	(43 mi.)	P. R. R. No. 47.		
143B	West Penn Junction, Pa.	68	P. R. R. No. 26.	-100.9072	Ibid., pp. 77-80.
	Blairsville Intersec., Pa.	(42 mi.)	P. R. R. No. 47.		
143C	Blairsville Intersec., Pa.	314	P. R. R. No. 47.	+238.0040	Ibid., pp. 46-71.
	Harrisburg, Pa.	(195 mi.)	P. R. R. No. 2.		
144	New Orleans, La.	135	Halfway House.	- 3.1523	Ch. of Eng. Rep. 1900, Pt. 7, pp. 4631-4645.
	Ocean Springs, Miss.		E ₁		
145	Baton Rouge, La.	144	P. B. M. XXXII.	+ 6.9856	Ibid., 1900, Pt. 7, pp. 4682-4708.
	New Orleans, La.		Halfway House		
146	Smithland, La.	104	P. B. M. XLV.	+ 6.1987	Ibid., 1900, Pt. 7, pp. 4709-4721.
	Baton Rouge, La.		P. B. M. XXXII.		
147	Fort Adams, Miss.	24	P. B. M. XLIX.	+ 6.0760	Ibid., 1900, Pt. 7, pp. 4721-4725.
	Smithland, La.		P. B. M. XLV.		
150	Decatur, Ala.	139	P. B. M. 50.	- 11.9243	C. and G. S. Rep. 1903, pp. 249-251.
	Birmingham, Ala.		P. B. M. 2.		
151	Tuscumbia, Ala.	86	P. B. M. 9.	+ 5.5652	Ibid., 1903, pp. 286-289; Ch. of Eng. Rep. 1896, Pt. 3, pp. 1982-1998.
	Corinth, Miss.		V		
152	Decatur, Ala.	86	P. B. M. 50.	+ 26.4098	Ch. of Eng. Rep. 1896, Pt. 3, pp. 1982-1998.
	Tuscumbia, Ala.		P. B. M. 9.		
153	Decatur, Ala.	72	P. B. M. 50.	+ 26.4163	C. and G. S. Rep. 1903, pp. 284-286.
	Tuscumbia, Ala.		P. B. M. 9.		
155	South Sioux City, Nebr.	116	B ₂	-127.0836	Ibid., 1903, pp. 252-256.
	Norfolk, Nebr.		T. B. M. 2.		
157A	Decatur, Ala.	196	P. B. M. 50.	- 41.5760	Ibid., 1903, pp. 244-249.
	Chattanooga, Tenn.		698 N.		
157B	Chattanooga, Tenn.	128	698 N.	- 30.3215	Ibid., 1903, pp. 242-244.
	Harriman, Tenn.		C ₂		
159A	Ludlow, Ky.	109	C.	-105.1874	Ibid., 1903, pp. 230-232.
	Georgetown, Ky.		W		
159B	Georgetown, Ky.	303	W	+ 32.9943	Ibid., 1903, pp. 232-239.
	Harriman, Tenn.		A ₂		
160	Knoxville, Tenn.	81	933 M C.	+ 42.5945	Ibid., 1903, pp. 239-240.
	Harriman, Tenn.		C ₂		
162	Morehead City, N. C.	863	7 M C.	-262.0148	U. S. Geol. Surv., 20th Ann. Rep., Pt. 1, pp. 376-378.
	Caswell, Tenn.		867 M C.	(- 859.627 ft.)	
164A	Wright, Tenn.	120	940 M C.	+ 20.0138	Ibid., p. 378.
	Cleveland, Tenn.		875 M C.	(+ 65.662 ft.)	
164B	Cleveland, Tenn.	671	875 M C.	+263.4319	Ibid., pp. 378-380.
	Brunswick, Ga.		10 M C.		
166A	Belpre, Ohio.	158	No. XL.	- 5.1780	C. and G. S. Rep. 1882, pp. 542-545.
	Chillicothe, Ohio.		Q		
166B	Chillicothe, Ohio.	158	Q.	+ 27.9232	C. and G. S. Rep. 1882, pp. 545-546.
	Cincinnati, Ohio.		T		
167A	Belpre, Ohio.	272	No. XL.	+ 26.1723	Leveling of U. S. E., submitted by U. S. Geol. Surv.
	Portsmouth, Ohio.	(169 mi.)	U. S. E.	(+ 85.867 ft.)	
167B	Portsmouth, Ohio.	222	U. S. E.	+ 14.9800	Do.
	Lawrenceburg, Ind.	(138 mi.)	U.	(+ 49.147 ft.)	
168	Grafton, W. Va.	170	M.	+114.4023	C. and G. S. Rep. 1882, pp. 540-542.
	Belpre, Ohio.		No. XL		
169A	Monaca, Pa.	40	25 C.	- 17.5190	MS. furnished by Ch. of Eng. and by U. S. Geol. Surv.
	Pittsburgh, Pa.	(25 mi.)	P. R. R. 100.	(- 57.477 ft.)	
169C	Benwood, W. Va.	111	U. S. E. 94 A.	- 11.6321	Leveling by U. S. E.; results submitted by U. S. Geol. Surv.
	Monaca, Pa.		25 C.	(- 38.163 ft.)	
169D	Marietta, Ohio.	124	U. S. E. 171 B.	- 17.2703	Do.
	Benwood, W. Va.		U. S. E. 94 A.	(- 56.661 ft.)	
170A	Dobbs Ferry, N. Y.	87	V.	- 49.7925	C. and G. S. Rep. 1903, pp. 291-294.
	Poughkeepsie, N. Y.		173 A.		
170B	Poughkeepsie, N. Y.	116	173 A.	+ 48.5028	Ibid., 1903, pp. 294-297.
	Greenbush, N. Y.		Gristmill		
171	Page, Nebr.	103	K ₂	+131.2314	Ibid., 1903, pp. 257-259.
	Norfolk, Nebr.		O ₁		
172	Chadron, Nebr.	427	C ₄	+421.1151	Ibid., 1903, pp. 268-276.
	Page, Nebr.		K ₂		
173A	Orin Junction, Wyo.	160	T ₁	+308.7615	Ibid., 1903, pp. 300-302.
	Crawford, Nebr.		G ₄		
173B	Crawford, Nebr.	41	G ₄	+103.9571	Ibid., 1903, pp. 298-300.
	Chadron, Nebr.		C ₄		
174	Cheyenne, Wyo.	247	B.	+417.1586	Ibid., 1903, pp. 278-283.
	Orin Junction, Wyo.		T ₁		
175	Denver, Colo.	169	A ₃	-262.6197	Ibid., 1899, pp. 289-293.
	Cheyenne, Wyo.		B.		
176	Cheyenne, Wyo.	172	B.	-196.7608*	Ibid., 1899, pp. 293-297.
	Rock Creek, Wyo.		U		
178	Anthony, Kans.	215	Anthony S. B. Base.	+ 45.7929	Ibid., 1903, pp. 261-266.
	Salina, Kans.		H ₁		
180A	Bowie, Tex.	233	1124 Gainv.	- 62.5517	Ibid., 1903, pp. 303-311.
	El Reno, Okla.		1327 Reno Junction.		
180B	El Reno, Okla.	198	1327 Reno Junction.	- 4.7097	Ibid., 1903, pp. 311-315.
	Anthony, Kans.		F ₅		
181A	St. Paul, Minn.	128	P. B. M. 68.	-100.5379	Ch. of Eng. Rep. 1899, Pt. 5, pp. 3420-3440.
	St. Cloud, Minn.		P. B. M. St. Cloud		

* This differs 1 meter from the value found in the report. An error of 1 meter was found in this line.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		<i>km.</i>		<i>m.</i>	
181B	St. Cloud, Minn.	119	P. B. M. St. Cloud	- 52.1694	Ibid., 1899, Pt. 5, pp. 3440-3457.
	Brainerd, Minn.		P. B. M. North Base		
182	Brainerd, Minn.	68	P. B. M. North Base	- 3.6394	Ibid., 1899, Pt. 5, pp. 3457-3468; 1905, Supp., pp. 80, 86.
	Aitken, Minn.		P. B. M. Courthouse		
183A	Cass Lake, Minn.	129	T. B. M. 92	+ 40.0211	Ibid., 1901, Supp., pp. 71-85; 1905, Supp., pp. 80, 83.
	Brainerd, Minn.		P. B. M. North Base		
184A	Lake Itasca, Minn.	76	P. B. M. Park House	+ 46.9142	Ibid., 1901, Supp., pp. 85-96; 1905, Supp., pp. 80, 83, 84.
	Cass Lake, Minn.		T. B. M. 92		
185A	Blackberry, Minn.	88	T. B. M. 230	- 9.9462	Ibid., 1901, Supp., pp. 97-111; 1905, Supp., pp. 80, 84, 85.
	Cass Lake, Minn.		T. B. M. 92		
186	Shreveport, La.	410	P. B. M. 46	-124.9945	C. and G. S. Rep. 1903, pp. 319-328.
	Fort Worth, Tex.		U		
187	Fort Worth, Tex.	109	U	-157.9008	Ibid., 1903, pp. 317-319.
	Bowie, Tex.		1124 Gainv		
188	Fort Worth, Tex.	75	U	+ 89.9821	Ibid., 1903, pp. 329-330.
	Granbury, Tex.		Comanche Δ		
189	Cleveland, Tenn.	50	875 M. C.	+ 55.1436	MS. furnished by U. S. Geol. Surv., Feb., 1903.
	Chattanooga, Tenn.		698 N		
190A	Alliance, Ohio	94	Br. 66	+124.9438	Leveling of the Pitts. Ft. W. and Ch. R. R., submitted by U. S. Geol. Surv.
	Monaca, Pa.		25 C	(+409.920 ft.)	
192A	Canton, Ohio	36	Br. 77	+ 19.9553	MS. furnished by U. S. Geol. Surv., Feb., 1903.
	E. Akron Jct., Ohio		Wall	(+ 65.470 ft.)	
192B	E. Akron Jct., Ohio	60	Wall	+117.6680	Do.
	Cleveland, Ohio		U. S. E. 2	(+386.049 ft.)	
194	Duluth, Minn.	470	B. M. 1 of U. S. Eng.	+ 5.0841	MS. furnished Mar. 2, 1903, by Ch. of Eng. from U. S. Lake Survey.
	Marquette, Mich.		1 (1871)		
195	Escanaba, Mich.	500	1 (1874)	+ 3.1775*	Do.
	Sand Beach, Mich.		U. S. B. M. E		
196	Milwaukee, Wis.	720	B. M. 1	+ 3.0279	Do.
	Sand Beach, Mich.		U. S. B. M. E		
197	Chicago, Ill.	130	P. B. M. 99	- 0.4404	Do.
	Milwaukee, Wis.		B. M. 1		
198	Marquette, Mich.	240	1 (1871)	+ 0.6770	Do.
	Iroquois Point, Mich.		Iroquois		
199	Iroquois Point, Mich.	126	Iroquois	+ 1.7274	Do.
	Detour, Mich.		P. B. M. Goetz		
200	Mackinaw, Mich.	210	B. M. 1	- 0.8284*	Do.
	Escanaba, Mich.		1 (1874)		
201	Detour, Mich.	72	Goetz	+ 3.4866*	Do.
	Mackinaw, Mich.		B. M. 1		
202	Detour, Mich.	260	Goetz	+ 5.8360*	Do.
	Sand Beach, Mich.		U. S. B. M. E		
203	Sand Beach, Mich.	48	U. S. B. M. E	- 9.0267	MS. furnished Mar. 2, 1903, by Ch. of Eng. from U. S. Lake Survey.
	Lexington, Mich.		Lexington 4.		
204	Lexington, Mich.	185	Lexington 4.	+ 2.8581	Do.
	Trenton, Mich.		(1877)		
205	Gibraltar, Mich.	7	(1877)	- 6.3912	Do.
	Trenton, Mich.		(1877)		
206	Trenton, Mich.	12	(1877)	+ 7.4113	Do.
	Amherstburg, Can.		Gauge		
207	Amherstburg, Can.	418	Gauge	- 3.3370	Do.
	Buffalo, N. Y.		L. H.		
208	Cleveland, Ohio	288	U. S. E. 1.	- 2.6478†	Do.
	Buffalo, N. Y.		L. H.		
209	Buffalo, N. Y.	80	L. H.	+100.8456	Do.
	Olcott, N. Y.		P. B. M. 4		
210	Olcott, N. Y.	180	P. B. M. 4.	+ 2.2409	Do.
	Oswego, N. Y.		A		
211	Oswego, N. Y.	131	A	- 54.4108	Do.
	Utica, N. Y.		L. S. 92		
212	Utica, N. Y.	148	L. S. 92.	+ 73.0104	Do.
	Vischers Ferry, N. Y.		L. S. 18		
213	Vischers Ferry, N. Y.	34	L. S. 18.	+ 53.9514	Do.
	Greenbush, N. Y.		Gristmill		
214	Erie, Pa.	130	1 (1873)	- 4.4781‡	Do.
	Buffalo, N. Y.		L. H.		
215	Buffalo, N. Y.	66	L. H.	- 2.6277	MS. furnished by U. S. Geol. Surv. Feb., 1903.
	Dunkirk, N. Y.		598 D		
216	Hornellsville, N. Y.	142	1141 D	+261.9448	Do.
	Charlotte, N. Y.		1 (1874)		
217	Charlotte, N. Y.	91	1 (1874)	+ 9.5418	MS. furnished by Ch. of Eng. Mar. 14, 1903.
	Oswego, N. Y.		A		
218	Sidney, N. Y.	99	Tel. Pole 991	+170.8679	MS. furnished Feb., 1903, by U. S. Geol. Surv.
	Utica, N. Y.	(61.4 mi.)	L. S. 92		
220	Irvinton, Pa.	62	1167 D	- 7.9602	Do.
	Lebanon, Pa.	(39 mi.)	1193 P		
221	Franklin, Pa.	93	987 P	- 54.9415	Do.
	Irvinton, Pa.		1167 D		
222	Salamanca, N. Y.	78	1391 D	+ 68.1732‡	Do.
	Irvinton, Pa.		1167 D		
223	Elmira, N. Y.	121	857 A	+101.6296	Do.
	Williamsport, Pa.		P. R. R. 46		
224	Harrisburg, Pa.	150	P. R. R. 2.	- 57.2873	Pa. R. R. B. M. Book, pp. 46, 110-113, 96-99.
	Williamsport, Pa.	(93 mi.)	P. R. R. 46		
225A	Hancock, Md.	89	F	+ 57.2077	MS. furnished by the B. & O. R. R.
	Washington Jct., Md.		B. & O. 44 A		
225B	Washington Jct., Md.	69	B. & O. 44 A	+ 43.4779	Do.
	Washington, D. C.		Capitol B. M.		

* These values are the result of the Lake Survey adjustment of the figure Escanaba-Mackinaw-Detour-Sand Beach. The unadjusted values are:

195	+3.1790
200	-0.8230
201	+3.4860
202	+5.8372

† This value is the result of the Lake Survey adjustment of the circuit Cleveland-Buffalo-Erie-Cleveland. The unadjusted value is -2.6441.

‡ This value is the result of the Lake Survey adjustment of the circuit Cleveland-Buffalo-Erie-Cleveland. The unadjusted value is -4.4815.

§ This line was run twice.

No.	Places.	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		m.	
226	Cumberland, Md.	90	I.	+ 61.9468	MS. furnished by the B. & O. R. R.
	Hancock, Md.	(56 mi.)	F		
227	Cumberland, Md.	35	I.	-275.0180	Do.
	Foley, Pa.	(22 mi.)	B. & O. 176		
228	Sidney, N. Y.	71	Tel. Pole 991	+ 20.2617	MS. furnished Feb., 1903, by U. S. Geol. Surv.
	Hancock, N. Y.		924 A	+229.2567	Do.
229	Poughkeepsie, N. Y.	222	173 A		
230	Binghamton, N. Y.	78	867 A	- 17.8684	Do.
	Hancock, N. Y.		924 A		
231	Fort Worth, Tex.	200	U.	- 20.5443	C. and G. S. Rep. 1903, pp. 332-335.
	Temple, Tex.		L.		
232	Temple, Tex.	89	L.	-110.1793	Ibid., 1903, pp. 336-337.
	Lampasas, Tex.		Lampasas NE. Base		
233A	Temple, Tex.	27	L.	+ 50.5745	Ibid., 1903, p. 338.
	Holland, Tex.		W ⁴		
234	Rock Creek, Wyo.	212	U.	- 4.2761	Ibid., 1903, pp. 340-345.
	Red Desert, Wyo.		B.		
235	Mackinaw, Mich.	290	B. M. 1.	+ 2.3491*	MS. furnished Mar. 2, 1903, by Ch. of Eng. from U. S. Lake Survey.
	Sand Beach, Mich.		U. S. B. M. E.		
236	Cleveland, Ohio.	155	U. S. E. 1.	+ 1.8303†	Do.
	Erie, Pa.		1 (1873)		
237A	Red Desert, Wyo.	420	B.	+737.8221	C. and G. S. Rep., 1904, App. 6, pp. 408-409.
	Ogden, Utah.		B.		
237B	Ogden, Utah.	217	B.	- 50.1589	Ibid., 1904, App. 6, p. 410.
	Pocatello, Idaho.		B.		
238	Pocatello, Idaho.	358	B.	+456.3112	Ibid., 1904, App. 6, p. 412.
	Owyhee, Idaho.		W ⁴		
239	Owyhee, Idaho.	937	Sea level	+903.5122	Ibid., 1905, App. 4, pp. 206-212.
	Seattle, Wash.		Sea level		
240	St. Cloud, Minn.	141	P. B. M. St. Cloud	- 99.6535	Pp. 20, 21, Precise Leveling in U. S., 1903-7.
	Evansville, Minn.		T ₁		
241	Evansville, Minn.	314	T ₁	+161.0497	Pp. 33-35, Precise Leveling in U. S., 1903-7.
	Stephen, Minn.		Stephen W. Base		
242	Evansville, Minn.	266	T ₁	-114.7609	Pp. 21, 22, Precise Leveling in U. S., 1903-7.
	Watertown, S. Dak.		U.		
243	Watertown, S. Dak.	358	U.	+194.2572	Pp. 25-27, Precise Leveling in U. S., 1903-7.
	Sioux City, Iowa.		P. B. M. 399		
244	Holland, Tex.	116	W ⁴	+ 54.0813	C. and G. S. Rep. 1904, App. 7, pp. 437, 438.
	Smithville, Tex.		W ⁵		
245	Smithville, Tex.	114	W ⁵	- 92.5571	Ibid., 1904, App. 7, pp. 438, 439.
	New Braunfels, Tex.		S ₂		
246	Smithville, Tex.	273	W ⁵	+100.6431	Pp. 37, 38, Precise Leveling in U. S., 1903-7.
	Galveston, Tex.		Sea level		
247†	Vidalia, La.	92	LXIV	- 1.0034	MS. furnished by Miss. River Com., Dec., 1906.
	Fort Adams, Miss.		P. B. M. XLIX		
248§	Vicksburg, Miss.	147	SW. Base	+ 6.9112	Do.
	Vidalia, La.		LXIV		
249	Acme, La.	35	P. B. M. 12 a.	- 9.1469	Ch. of Eng. Rep., 1902, Pt. 2, pp. 1466-1467.
	Barbin Landing, La.		T. B. M. 53		
250	Archibald, La.	■	P. B. M. Archibald	+ 5.2811	Ibid., 1902, Pt. 2, pp. 1463, 1464.
	Columbia, La.		T. B. M. 137		
251	Camden, Ark.	183	P. B. M. Camden IV	- 24.5491	Ibid., 1902, Pt. 2, pp. 1451-1453.
	Shreveport, La.		P. B. M. 46		
252	Delhi, La.	35	P. B. M. 13	+ 5.8046	Ibid., 1902, Pt. 2, p. 1462.
	Crowville, La.		P. B. M. Gray		
253	Gilbert, La.	29	P. B. M. Gilbert	+ 1.8374	Ibid., 1902, Pt. 2, p. 1465.
	New Light, La.		P. B. M. New Light		
254	Blackberry, Minn.	105	T. B. M. 230	+ 26.3900	Ibid., 1903, Supp., pp. 80-86; 1905, Supp. pp. 80, 85.
	Aitkin, Minn.		P. B. M. Courthouse		
255	Washington, D. C.	48	Capitol B. M	+ 5.7282	MS. furnished by B. & O. R. R.
	Relay, Md.		B. & O. 31	(+ 18.793 ft.)	
256	Relay, Md.	■	B. & O. 31	- 49.2281	Do.
	Washington Jet., Md.		B. & O. 44 A	(-161.509 ft.)	
257	Relay, Md.	12	B. & O. 31	+ 14.1938	Do.
	Baltimore, Md.		B. & O. 40	(+ 46.567 ft.)	
258	Baltimore, Md.	6	B. & O. 40	+ 7.6634	Pp. 28, 29, Precise Leveling in U. S., 1903-7.
	Baltimore, Md.		Sea level		
259	Cumberland, Md.	117	I.	-304.6561	MS. furnished by B. & O. R. R.
	Amblersburg, W. Va.		L	(-999.526 ft.)	
260	Amblersburg, W. Va.	48	L.	+191.3401	Do.
	Grafton, W. Va.		M	(+627.755 ft.)	
262	Bentons Ferry, W. Va.	127	885 Pittsburgh	+ 72.0615	Do.
	Benwood, W. Va.		U. S. E. 94 A	(+236.422 ft.)	
263	Benwood, W. Va.	103	U. S. E. 94 A	- 65.0215	MS. furnished by B. & O. R. R., Feb., 1904.
	Uhrichsville, Ohio.		B. & O. 48	(-213.3246 ft.)	
264	Uhrichsville, Ohio.	74	B. & O. 48	- 29.3801	Do.
	Warwick, Ohio.		B. & O. 449	(- 96.391 ft.)	
265	Warwick, Ohio.	51	B. & O. 449	- 48.9522	Do.
	Sullivan, Ohio.		B. & O. 481	(-160.604 ft.)	
266	Sullivan, Ohio.	28	B. & O. 481	+ 24.4871	P. 40, Precise Leveling in U. S., 1903-7.
	Greenwich, Ohio.		B. & O. 495		
267	Greenwich, Ohio.	12	B. & O. 495	+ 26.0051	MS. furnished by B. & O. R. R., Feb., 1904.
	Boughtonville, Ohio.		B. & O. 503	(+ 85.318 ft.)	
268	Boughtonville, Ohio.	116‡	B. & O. 503	+ 73.3311	Pp. 32, 33, Precise Leveling in U. S., 1903-7.
	Deshler, Ohio.		I ₁		
269	Uhrichsville, Ohio.	113	B. & O. 48	+ 49.7325	MS. furnished by U. S. Geol. Surv.
	Zanesville, Ohio.		U. S. E. 1	(+163.164 ft.)	
270	Zanesville, Ohio.	104	U. S. E. 1	- 16.0990	Do.
	Valley Crossing, Ohio.		R	(- 52.818 ft.)	
271	Valley Crossing, Ohio.	15	R	- 7.8234	Do.
	Columbus, Ohio.		T		

* This is the result of the Lake Survey adjustment. See note on p. 63. The unadjusted value is +2.3424.

† This is the result of the Lake Survey adjustment. The unadjusted value is +1.8294.

‡ This line supersedes line 148.

§ This line supersedes line 42.

|| This line was assigned a weight of 1½ times a regular line of the same length on account of the rerunning which amounted to more than an additional single running.

No.	Places,	Distance.	Bench marks.	Difference of elevation.	Reference.
		km.		m.	
272	Valley Crossing, Ohio.....	65	R.....	+ 34.7265	MS. furnished by U. S. Geol. Surv.
	Chillicothe, Ohio.....		Q.....	+ 31.3551	Do.
273	Chillicothe, Ohio.....	80	U. S. E.....	(+102.871 ft.)	Leveling of U. S. Eng. submitted by U. S. Geol. Surv.
	Portsmouth, Ohio.....		U. S. E. 171 B.....	- 32.8743	MS. furnished by B. & O. R. R.
274	Marietta, Ohio.....	122	U. S. E. 1.....	(-107.855 ft.)	
	Zanesville, Ohio.....		B. & O. 176.....	+215.8208	
275	Foley, Pa.....	208	818 Pittsburgh.....	(+708.072 ft.)	Do.
	Benvenue, Pa.....		818 Pittsburgh.....	- 22.0540	
276	Benvenue, Pa.....	71	B. & O. 349.....	(- 72.356 ft.)	Do.
	Ellwood City, Pa.....		B. & O. 349.....	+ 13.9604	
277	Ellwood City, Pa.....	39	B. & O. 376.....	(+ 45.8020 ft.)	P. 41, Precise Leveling in U. S., 1903-7.
	Struthers, Ohio.....		B. & O. 349.....	+ 41.6606	P. 42, Precise Leveling in U. S., 1903-7.
278	Ellwood City, Pa.....	26	25 A.....	- 76.5850	MS. furnished by B. & O. R. R.
	Monaca, Pa.....		B. & O. 376.....	(- 5.4860 ft.)	House Doc. 263, 59th Cong., 1st sess., pp. 94-126.
280	Struthers, Ohio.....	69	Br. 66.....	+ 8.5321	Ibid., pp. 126-169.
	Alliance, Ohio.....		B. & O. 449.....	- 80.9811	MS. furnished by U. S. Geol. Surv.
281	Warwick, Ohio.....	25	Wall.....	+ 20.7500	Do.
	East Akron Jct., Ohio.....		P. B. M. 49.....	+ 50.8714	Do.
282	Pekin, Ill.....	251	P. B. M. 2.....	-648.9277	This publication, pp. 32, 33.
	Grafton, Ill.....		P. B. M. 9.....	-314.3604	Ibid., p. 34.
283	Chicago, Ill.....	287	P. B. M. 99.....	+ 20.2896	Ibid., p. 35.
	Pekin, Ill.....		P. B. M. 49.....	-137.7703	Ibid., p. 36.
284	Pekin, Ill.....	138	P. B. M. 49.....	+171.3510	Ibid., p. 36.
	Champaign, Ill.....		F ₁	+751.6454	Ibid., p. 37.
285A	Champaign, Ill.....	92	F ₁	-895.9227	Ibid., p. 38.
	Oakland, Ill.....		C ₄	-220.6786	Ibid., p. 39.
285B	Oakland, Ill.....	124	C ₄	-215.1169	Ibid., p. 41.
	Olney, Ill.....		B ₂	- 17.2730	Ibid., p. 40.
286	San Diego, Cal.....	375	Sea level.....	-570.9610	Ibid., p. 44.
	Barstow, Cal.....		J ₂	-703.8453	Ibid., pp. 42, 43.
287	Pocatello, Idaho.....	427	B ₂	- 18.2478	Ibid., p. 43.
	Butte, Mont.....		D ₂	+29.5826	MS. furnished by U. S. Geol. Survey, 1912.
288	Ogden, Utah.....	63	B.....	+ 18.2327	MS. furnished by U. S. Geol. Survey, 1912.
	Salt Lake City, Utah.....		W ₁	+ 29.5826	MS. furnished by U. S. Geol. Survey, 1912.
289	Barstow, Cal.....	222	J ₂	+ 16.9636	MS. furnished by Chief of Eng., 1912.
	Goffs, Cal.....		L ₅	+ 27.7884	Do.
290	Goffs, Cal.....	170	L ₅	+ 34.4056	Do.
	Las Vegas, Nev.....		P.....	+ 53.0216	Do.
291	Butte, Mont.....	409	D ₂	- 42.8120	Do.
	Huntley, Mont.....		U. S. R. S. 3.....	+ 78.0957	MS. furnished by Chief of Eng., 1912.
292	Las Vegas, Nev.....	404	P.....	+ 25.3012	Do.
	Zenda, Utah.....		I ₂	+ 27.3510	
293	Salt Lake City, Utah.....	324	W ₁		
	Zenda, Utah.....		I ₂		
294	Huntley, Mont.....	291	U. S. R. S. 3.....		
	Cadiz, Wyo.....		W ₂		
295	Crawford, Nebr.....	377	G ₂		
	Cadiz, Wyo.....		W ₂		
296	El Reno, Okla.....	324	1327 Reno Junction.....		
	Jericho, Tex.....		B ₁₀		
297	Goffs, Cal.....	960	L ₅		
	Isleta, N. Mex.....		U. S. G. S. 4891.....		
298	Isleta, N. Mex.....	22	U. S. G. S. 4891.....		
	Albuquerque, N. Mex.....		U. S. G. S. 4951.....		
299	Fort Worth, Tex.....	997	U.....		
	El Paso, Tex.....		U. S. G. S. 3698.....		
300	Jericho, Tex.....	640	B ₁₀		
	Belen, N. Mex.....		U. S. G. S. 4793.....		
301	Belen, N. Mex.....	30	U. S. G. S. 4793.....		
	Isleta, N. Mex.....		U. S. G. S. 4891.....		
302	Belen, N. Mex.....	361	U. S. G. S. 4793.....		
	El Paso, Tex.....		U. S. G. S. 3698.....		
303	Albuquerque, N. Mex.....	21	U. S. G. S. 4951.....		
	Isleta, N. Mex.....		U. S. G. S. 4891.....		
304	Isleta, N. Mex.....	30	U. S. G. S. 4891.....		
	Belen, N. Mex.....		U. S. G. S. 4793.....		
305	Lawrenceburg, Ind.....	175	U.....		
	Louisville, Ky.....		U. S. E. B. M. 604 M.....		
306	Louisville, Ky.....	70	U. S. E. B. M. 604 M.....		
	Wabash Island, Ky.....		P. B. M. 839.....		
307	Shawneetown, Ill.....	185	P. B. M. Station.....		
	Cairo, Ill.....		P. B. M. 2.....		
309	Georgetown, Ky.....	127	W.....		
	Louisville, Ky.....		602 B.....		
311	Duquoin, Ill.....	114	R ₂		
	Shawneetown, Ill.....		P. B. M. Station.....		
312	Mitchell, Ind.....	152	X.....		
	Terre Haute, Ind.....		U. S. G. S. 513.....		
313	Terre Haute, Ind.....	62	U. S. G. S. 513.....		
	Oakland, Ill.....		C ₄		
314	Mitchell, Ind.....	102	X.....		
	Louisville, Ky.....		U. S. E. B. M. 604 M.....		
315	Terre Haute, Ind.....	145	U. S. G. S. 513.....		
	Vincennes, Ind.....		No. 1.....		
316	Vincennes, Ind.....	203	No. 1.....		
	Wabash Island, Ky.....		P. B. M. 839.....		

The statements of the local relative elevations which were held fixed in the adjustments of 1899, 1903, and 1907 are here repeated in abbreviated form for convenience of reference, together with new matter of the same kind. The complete statements may be found on the pages of Appendix 8, Report for 1899, Appendix 3, Report for 1903, and Precise Leveling in United States, 1903-1907, referred to in the separate paragraphs.

No. 1.—VICINITY OF NEW YORK CITY.

The differences of elevation which are fixed, see pages 402–404 of Appendix 8, Report for 1899, are—

Perth Amboy, N. J., F—Sea level at Sandy Hook = $+2^m.3640$; distance 55 kilometers.
Dobbs Ferry, V—Sea level at Sandy Hook = $+2^m.9357$; distance 144 kilometers.

6A.—CINCINNATI, OHIO, TO LAWRENCEBURG, IND., AND LUDLOW, KY.

The differences of elevation fixed as indicated on page 360 of Appendix 3, Report for 1903, are—

Cincinnati, T—Lawrenceburg, U = $+18^m.4695$; distance 37 kilometers.
Cincinnati, T—Cincinnati, O₁ = $+16^m.7277$.
Cincinnati, T—Ludlow, A₂ = $+4^m.0849$.
Cincinnati, T—Ludlow, C = $+4^m.4507$; distance 8 kilometers.

No. 10.—JEFFERSON CITY, MO.

The differences of elevation fixed as indicated on page 405 of Appendix 8, Report for 1899, are—

Old B. M. 90 (85)—No. XXVII = $-14^m.8684$; distance 0.5 kilometer.
No. XXVII—No. XXVIII = $-6^m.8101$; distance 0.2 kilometer.

No. 12.—PLEASANT HILL, MO.

The difference of elevation fixed as indicated on page 405 of Appendix 8, Report for 1899, is No. LI—No. LII = $+1^m.2130$; distance 1.2 kilometers.

No. 14.—KANSAS CITY, MO.

The difference of elevation fixed as indicated on page 405 of Appendix 8, Report for 1899, is LVIII—Old M. R. C. B. M. 244 = $-1^m.9810$; distance 8.3 kilometers.

No. 15B.—HOLLIDAY, KANS.

The difference of elevation fixed as indicated on page 361 of Appendix 3, Report for 1903, is No. LXIII—No. LXII = $+0^m.0206$.

No. 17A.—ABILENE, SOLOMON, AND SALINA, KANS.

The differences of elevation fixed as indicated in Appendix 8, Report for 1899, on pages 405–406, and on page 361 of Appendix 3, Report for 1903, are—

Abilene, B₁—Solomon, C₁ = $-5^m.6278$; distance 14 kilometers.
Abilene, B₁—Abilene, Y₂ = $+2^m.2729$; distance 2 kilometers.
Solomon, C₁—Salina, H₁ = $-15^m.3095$; distance 23 kilometers.

No. 21.—ELLIS, KANS.

The difference of elevation fixed as indicated on page 406 of Appendix 8, Report for 1899, is A₂—B₂ = $+0^m.1163$.

No. 24.—LIMON, COLO.

The difference of elevation fixed as indicated on page 406 of Appendix 8, Report for 1899, is N—P = $-6^m.9860$.

No. 27.—DENVER, COLO.

The differences of elevation fixed as indicated on page 406 of Appendix 8, Report for 1899, are Z₁—B₂ = $+0^m.6844$ and B₂—A₂ = $+0^m.0360$.

No. 29A.—NEAR BILOXI, MISS.

The difference of elevation fixed as indicated on page 361 of Appendix 3, Report for 1903, is Ocean Springs E₁—Sea level at Biloxi = $+4^m.7915$.

No. 33.—CORINTH, MISS.

The difference of elevation fixed as indicated on pages 407–408 of Appendix 8, Report for 1899, is W—V = $+0^m.0569$.

No. 35.—CAIRO, ILL.

The difference of elevation fixed as indicated on page 408 of Appendix 8, Report for 1899, is $P. B. M. 2 - P. B. M. 1 = +0^m.4031$.

No. 41.—VIDALIA, LA.

The difference of elevation fixed as indicated on page 408 of Appendix 8, Report for 1899, is $LXIV - LXI = +0^m.9880$; distance 5.8 kilometers.

No. 43.—NEAR VICKSBURG, MISS.

SW. Base and NE. Base at Delta, La., P. B. M. "B." near Vicksburg, and M. R. C. $1\frac{9}{17}$ at Kleinston, Miss., were connected by the Mississippi River Commission in 1905. The discrepancies between the elevations as determined from the earlier leveling and as determined in 1905 are too large to be due to errors of leveling. Therefore the values involving these bench marks, given in the statement of local relation, on page 409 of Appendix 8, Report for 1899, are no longer adopted. The elevations as given by the 1905 line are adopted.

The following differences of elevations, fixed as indicated on pages 408–409 of Appendix 8, Report for 1899, remain unchanged:

Delta No. 211 – Delta No. 215 = $-0^m.1143$; distance 3.6 kilometers.

Delta No. 211 – Vicksburg, B. M. Cistern = $-31^m.1994$; distance 12 kilometers.

Delta No. 211 – Delta, SW. Base = $+1^m.1314$; distance 2.6 kilometers.

Delta No. 211 – Vicksburg, P. B. M. 2 = $-1^m.6679$; distance 15 kilometers.

No. 45.—WILKERSONS LANDING, MISS.—ARKANSAS CITY, ARK.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is Arkansas City, F – Wilkersons Landing, P. B. M. 84 = $-0^m.0564$; distance 2 kilometers.

No. 49.—VAN BUREN, ARK.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is No. XXXIX – No. XXXVIII = $-0^m.0072$.

No. 52.—CHESTER, ARK.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is No. XLIX – No. XLVIII = $-1^m.1358$.

No. 54.—BOSTON, MO.

The difference of elevation fixed as indicated on page 410 of Appendix 8, Report for 1899, is No. XCVI – No. XCVII = $-0^m.0008$.

No. 58.—WASHINGTON, D. C.

Elevations of bench marks at Washington above mean sea level, which was based on tidal observations at the Navy Yard on the Potomac River and an assumed fall of the river from Washington to the sea, were not used in the 1912 adjustment. (See p. 60, Precise Leveling in the United States, 1903–1907; p. 362, Appendix 3, Report for 1903; p. 410, Appendix 8, Report for 1899; and p. 256, Appendix 3, Report for 1896.)

No. 60.—RICHMOND, VA.

The elevation of O fixed as indicated on page 411 of Appendix 8, Report for 1899, is O – Sea level = $+58^m.1957$.

No. 62.—OLD POINT COMFORT, VA.

The elevation of U fixed as indicated on page 411 of Appendix 8, Report for 1899, is U – Sea level = $+2^m.6875$.

No. 67.—ANNAPOLIS, MD.

The elevation of the Perkins Tidal B. M. fixed as indicated on page 411 of Appendix 8, Report for 1899, is ("a" or Perkins Tidal B. M.) – Sea level = $+1^m.268$.

No. 71.—GIBRALTAR, MICH.

The difference of elevation fixed as indicated on page 411 of Appendix 8, Report for 1899, is $1 (1898) - (1877) = +1^m.5488$.

No. 74B.—SHREVEPORT, LA.—BODCAU, LA.

The difference of elevation fixed as indicated on page 363 of Appendix 3, Report for 1903, is Bodcau, P. B. M. 44—Shreveport, P. B. M. 46 = $+2.4335$; distance, 15 kilometers.

No. 75.—MONROE, LA.

The difference of elevation fixed as indicated on page 411 of Appendix 8, Report for 1899, is P. B. M. 24—P. B. M. 27 = $-1^m.9772$; distance, 2 kilometers.

No. 77.—RAYVILLE, LA.

The difference of elevation fixed as indicated on page 412 of Appendix 8, Report for 1899, is P. B. M. 17—P. B. M. 16 = $+2^m.3294$.

No. 82.—JONESVILLE, LA.

In the publication of the lines from Vidalia to Jonesville and from Jonesville to Concordia (see Report of the Chief of Engineers, U. S. Army, for 1902, Pt. II, pp. 1451 and 1466) the determination of P. B. M. 5 in 1894 differs from that given in manuscript in the Vicksburg tabulation (see p. 414 of Appendix 8, Report for 1899). As now published, there are no discrepancies between the various determinations. In the report referred to, junction is made on P. B. M. 4, and therefore that bench mark is made the junction point in this adjustment.

No. 85.—PARKEVILLE, LA.

The difference of elevation fixed as indicated on page 412 of Appendix 8, Report for 1899, is T. B. M. 74—P. R. C. Parkeville = $+1^m.2220$.

No. 95.—AUSTIN, MISS.

The fixed relation between the bench marks is shown on page 412 of Appendix 8, Report for 1899.

No. 107.—GRAFTON, ILL.

P. B. M. 3, which was considered the most stable of the bench marks at Grafton (see p. 412 of Appendix 8, Report for 1899), was moved and reset in 1901. P. B. M. 2 was adopted as the junction point, and a mean value of the difference between P. B. M. 2 and P. B. M. 3, in its old position, was determined as follows: P. B. M. 3—P. B. M. 2, from the line Grafton to Cairo = $+2.9471$ meters; from the line Keokuk to Grafton = $+2.9496$ meters. The mean is $+2.9484$ meters and is adopted. (See the Report of the Chief of Engineers, U. S. Army, for 1884, pt. 4, pp. 2476, 2512.)

No. 123.—ST. JOSEPH, MO.

The difference of elevation fixed as indicated on page 413 of Appendix 8, Report for 1899, is P. B. M. 287—P. B. M. 290 = $-0^m.9892$.

No. 133B.—TROY, N. Y.

The difference of elevation of two bench marks in Troy, as determined by the Board of Engineers on Deep Waterways, is adopted as fixed, namely, D. W. Troy 2—D. W. Troy 1 (or N. Y. 12) = $+0^m.7925 = +2.60$ feet.

No. 140A.—ERIE, PA.

According to information furnished by the engineer in charge at Erie, B. M. 1 (1873) is 2.200 feet lower than the United States Engineers' bench mark on the lighthouse; hence, L. H. — 1 (1873) = $+0^m.6706$.

No. 141A.—PITTSBURGH, PA.

The following differences of elevation, as determined by the United States Geological Survey lines from Erie to Pittsburgh and Grafton to Pittsburgh, are adopted as fixed:

Braddock, P. R. R. 88—Pittsburgh, Penn avenue curb = $+28^m.0770$; distance, 7.6 kilometers.

West Penn Junction, P. R. R. 26—Pittsburgh, Penn avenue curb = $+15^m.8292$; distance, 27.3 kilometers.

Pittsburgh, P. R. R. 99—Pittsburgh, Penn avenue curb = $+2^m.1766$; distance, 1.4 kilometers.

And from the P. R. R. bench mark book is adopted as fixed: P. R. R. 99—P. R. R. 100 = $-0^m.0518$.

The following difference of elevation, as determined by the United States Geological Survey, on the line Grafton to Pittsburgh, is considered fixed: Benvenue, 818 Pittsburgh, 1899—Pittsburgh, Penn avenue curb = $+81.563$ feet = 24.8605 meters; distance, 1.5 kilometers.

This with the other fixed differences of elevation above, gives: Benvenue, 818 Pittsburgh, 1899—P. R. R. 99 = $+22.6839$ meters.

No. 143D.—HARRISBURG, PA.

The differences of elevation fixed as indicated on page 364 of Appendix 3, Report for 1903, are:

P. R. R. 1—No. XXIX = -11.2227 meters.

P. R. R. 2—P. R. R. 1 = $+5.2160$ meters.

No. 149.—BIRMINGHAM, ALA.

The following difference of elevation, as determined by the Corps of Engineers, United States Army, on line from York to Birmingham, is considered fixed: P. B. M. 1—P. B. M. 2 = $+4^m.5173$.

No. 154.—SIOUX CITY, IOWA.

The difference of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, is P. B. M. 399—B₂ = -1.0821 meters; distance, 16 kilometers. Using the leveling of 1904, Watertown to Sioux City, gives a value differing only 8.6 mm. from the above value, which is therefore not changed. (See p. 24, Precise Leveling in the United States, 1903–1907.)

No. 156.—NORFOLK, NEBR.

The differences of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, are—

T. B. M. 2—N₁ = -0.8132 meter.

O₁—N₁ = $+1.1565$ meters.

No. 158.—HARRIMAN, TENN.

The difference of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, is A₂—C₂ = -7.1484 meters.

No. 161.—MOREHEAD CITY, N. C.

The difference of elevation fixed as indicated on page 365 of Appendix 3, Report for 1903, is 7 M C—Sea level = $+2.1186$ meters. Six months' record in 1898 with self-registering tide gauge gave an elevation for 7 M C of 6.929 feet. As this differed but 0.02 foot from the value used in 1903, the above difference of elevation is not changed.

No. 163.—NEAR KNOXVILLE, TENN.

The differences of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, are—

Caswell, 867 M C—Knoxville, 933 M C = -20.0834 meters; distance, about 10 kilometers.

Knoxville, 933 M C—Wright, 940 M C = -2.1626 meters; distance, about 10 kilometers.

No. 165.—BRUNSWICK, GA.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is 10 M C—Sea level = +3.2577 meters.

No. 169E.—BELPRE TO MARIETTA, OHIO.

The following difference of elevation, determined by the Corps of Engineers, United States Army, and transmitted to this office by the United States Geological Survey, is considered fixed; Belpre, No. XL—Marietta, U. S. E. 171 B = +29.722 feet = +9.0593 meters; distance, 13 miles, or 21 kilometers.

No. 179.—ANTHONY, KANS.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is Anthony SE. base—F_g = +9.8326 meters; distance, approximately, 3 kilometers.

No. 193.—CLEVELAND, OHIO.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is U. S. E. 2—U. S. E. 1 = -1.1186 meters.

No. 219.—BAINBRIDGE AND SIDNEY, N. Y.

The difference of elevation fixed as indicated on page 366 of Appendix 3, Report for 1903, is Bainbridge, 989 A—Sidney, Tel. Pole 991 = -0.4401 meter; distance, 2 kilometers.

No. 261.—GRAFTON, VALLEY FALLS, AND BENTON FERRY, W. VA.

Bench marks at Grafton and Valley Falls were connected by the United States Geological Survey on the line Grafton to Pittsburgh, and by the Baltimore & Ohio Railroad on the line Cumberland to Benwood, with the following results:

Grafton, M—Valley Falls, 986 Pittsburgh, 1899 = +11.251 feet by U. S. G. S.

Grafton, M—Valley Falls, 986 Pittsburgh, 1899 = +11.2596 feet by B. & O. R. R.

Mean adopted, +11.2553 feet = 3.4306 meters; distance, 4.8 miles = 8 kilometers.

The difference between bench marks at Grafton and Benton Ferry was also determined as follows:

Grafton, M—Benton Ferry, 885 Pittsburgh, 1899 = +111.748 feet by U. S. G. S.

Grafton, M—Benton Ferry, 885 Pittsburgh, 1899 = +111.7658 feet by B. & O. R. R.

Mean adopted, +111.7569 feet = +34.0636 meters; distance, 17.4 miles = 28 kilometers.

No. 279.—MONACA, PA.

The following difference of elevation, determined by the Corps of Engineers, United States Army, and transmitted to this office by the United States Geological Survey, is considered fixed: Monaca, 25 A—Monaca, 25 C = +67.291 feet = +20.5103 meters.

No. 286.—CHICAGO, ILL.

Five bench marks in Chicago, determined on the line Savanna to Chicago in 1883, were re-determined in 1904 on the line Grafton to Chicago. The following are the observed elevations from each line, all referred to P. B. M. 99 as 180.3077 meters:

Bench mark.	1883	1904	1904-1883
	<i>Meters.</i>	<i>Meters.</i>	<i>mm.</i>
P. B. M. 99.....	180.3077	180.3077	0.0
B. M. VII.....	181.5620	181.5405	-21.5
P. B. M. 96.....	182.3783	182.3750	-3.3
B. M. VI.....	181.4351	181.4441	+9.0
P. B. M. 98.....	182.4300	182.4168	-13.2
Mean.....			-5.8

This indicates that P. B. M. 99 and P. B. M. 96 are stable and that the other bench marks have changed in elevation in the interval. It was reported in 1904 that B. M. VII had been damaged. P. B. M. 99 was retained as the junction point between these lines and the water leveling on Lake Michigan. New elevations from the 1904 line are given for the other bench marks.

NO. 308.—NEAR SHAWNEETOWN, ILL.

The difference of elevation P. B. M. Station—P. B. M. 839 as observed by the Ohio River Survey in 1906 was +2.9499, and as observed by the Wabash River Survey in 1911 was +2.9598. The mean adopted is P. B. M. Station—P. B. M. 839 = +2.9548 meters.

The following differences of elevation, representing the mean of the two Surveys were also held fixed.

P. B. M. 839—P. B. M. 842 = +0.5014 meters.

P. B. M. Station—P. B. M. Hotel = -4.9533 meters.

NO. 310.—LOUISVILLE, KY.

Differences of elevation between bench marks in Louisville were determined by the Corps of Engineers, United States Army, during the Ohio River Survey in 1903 and by the United States Geological Survey in 1906 and 1911. A local adjustment gives the following differences which are adopted as fixed; connections in the adjustment were made on 604 M.

U. S. E. B. M. No. 10 (=602B)—U. S. E. B. M. 603 = +0.3687 meters.

U. S. E. B. M. 604M—U. S. E. B. M. 603 = +4.3984 meters.

U. S. E. B. M. 604M—B. M. 13 = -7.2128 meters.

B. M. 13—B. M. 86 or No. 16 = -0.0931 meters.

THE CIRCUIT CLOSURES.

The leveling shown in the preceding table and paragraphs forms a large number of circuits, which are clearly shown on the sketch opposite page 58. The closing error in millimeters and circumference in kilometers are printed inside each circuit. These circuits are also given below in a table for convenient reference, arranged in the order of the magnitude of the closures expressed in millimeters per kilometer, the best closure being placed first. Only simple circuits are used, i. e., there is no circuit given in the table, or the closure shown on the sketches, which is divided by cross lines into smaller circuits.

For all circuits of which the Atlantic, the Pacific, or the Gulf of Mexico forms one side, it is assumed that the mean sea surface is everywhere the same level on the Atlantic, the Pacific, and the Gulf of Mexico, and the circumferences of such circuits do not include tidewater distances.

A plus sign on the closing error indicates that the elevation as carried around the circuit in a clockwise direction is too great.

The last column shows the character of the lines forming the circuits, the different grades of lines being mentioned in decreasing order of the number of kilometers entering into the circuit. The symbols 1899— and 1899+ in the last column refer, respectively, to leveling by the Coast and Geodetic Survey previous to 1899, and leveling by the Coast and Geodetic Survey in 1899 and later. The leveling referred to by "Eng." was done under the direction of the Corps of Engineers, United States Army, the Mississippi River Commission, or the Missouri River Commission, with Kern instruments. "Eng. Wye." refers to leveling done with a wye level under the direction of the Corps of Engineers, United States Army, or of the Board of Engineers on Deep Waterways. The abbreviation "G. S. 1905+" refers to leveling done by the United States Geological Survey in 1905 and later years with instruments and methods similar to those used by the Coast and Geodetic Survey in 1899 and later; "Geol." refers to leveling done by the United States Geological Survey previous to 1905; "Lake" refers to leveling done by the United States Lake Survey, and "Water" to water leveling on the lakes. "Van O." refers to Van Orden leveling. The orthometric correction was applied to the observed elevations before computing the circuit closures. The orthometric correction is discussed on pages 49-53.

Closing errors of circuits.

[The circumferences given for the circuits of which tide water forms one side do not include the tide-water distance.]

No.	Circuit.	Circuit closure.	Ortho-metric correction.	Corrected closure.	Circumference of circuit.	Closure per kilometer.	Character of lines.
		mm.	mm.	mm.	km.	mm.	
1	Savanna-Chicago-Sand Beach-Escanaba-Marquette-St. Paul-Savanna.	+ 31.7	- 17.8	+ 13.9	2877	+0.005	Water, Eng., Lake.
2	San Diego-Goffs-Ogden-Pocatello-Seattle.....	-1216.2	+1241.4	+ 25.2	3070	+0.008	1899+.
3	Belpre-Chillicothe-Portsmouth-Belpre.....	+ 4.8	- 0.5	+ 4.3	510	+0.008	Eng. Wye, 1899-, G. S. 1905+.
4	Cincinnati-Chillicothe-Uhrichsville-Warwick-Destler-Cincinnati.	+ 8.2	+ 0.8	+ 9.0	993	+0.009	1899+, G. S. 1905+, 1899-, B. & O.
5	Sand Beach-Mackinaw-Escanaba-Sand Beach.	+ 13.6	0.0	+ 13.6	1000	+0.014	Water.
6	Sand Beach-Detour-Mackinaw-Sand Beach...	- 8.8	0.0	- 8.8	622	-0.014	Water.
7	Cleveland-Erie-Buffalo-Cleveland.....	- 8.3	0.0	- 8.3	573	-0.014	Water.
8	Zanesville-Chillicothe-Belpre-Marietta-Zanesville.	- 9.5	- 2.7	- 12.2	470	-0.026	G. S. 1905+, 1899-, Eng. Wye.
9	Oswego-Utica-Greenbush-Coopersville-Oswego	- 20.4	- 10.6	- 31.0	965	-0.031	Lake, Eng. Wye, Water.
10	Concordia-Archibald-Columbia-Jonesville-Concordia.	- 8.9	+ 0.2	- 8.7	258	-0.034	Eng.
11	Biloxi-Smithland-Barbin Ldg.-Shreveport-Fort Worth-Galveston.	+ 96.7	- 36.4	+ 60.3	1791	+0.034	1899+, Eng.
12	Decatur-Tuscumbia-Decatur.....	- 6.5	+ 0.1	- 6.4	158	-0.040	Eng., 1899+.
13	Kansas City-Sioux City-Norfolk-Abilene-Holiday-Kansas City.	+ 133.6	- 63.9	+ 69.7	1325	+0.053	1899+, Eng., 1899-.
14	El Reno-Abilene-Limon-Colorado Springs-Denver-Cheyenne-Ogden-Goffs-Belen-El Reno.	+ 504.4	- 229.6	+ 274.8	5211	+0.053	1899+, 1899-.
15	Utica-Bainbridge-Vischers Ferry-Utica.....	- 16.2	- 5.8	- 22.0	417	-0.053	Geol., Lake.
16	Harrisburg-Elmira-Hornellsville-Salamanca-Irvineton-Franklin-Pittsburg-Harrisburg.	+ 72.4	- 7.1	+ 65.3	1228	+0.053	Geol., P. R. R.
17	Vicksburg-Rayville-Concordia-Vidalia-Vicksburg.	+ 19.3	- 0.4	+ 18.9	147	+0.054	Eng.
18	Chicago-Savanna-Grafton-Pekin-Chicago.....	- 71.6	- 2.9	- 74.5	1333	-0.057	Eng.
19	Hancock-Bainbridge-Binghamton-Hancock...	+ 10.5	+ 2.4	+ 12.9	211	+0.061	Geol.
20	Monroe-Camden-Shreveport-Monroe.....	+ 40.5	- 4.4	+ 36.1	526	+0.069	Eng.
21	Cleveland-Warwick-Uhrichsville-Benwood-Monaca-Alliance-Ellwood City-Pittsburg-Franklin-Leboeuf-Erie-Cleveland.	+ 63.9	+ 17.9	+ 81.8	1102	+0.074	Geol., B. & O., Water, Eng. Wye, P. R. R., 1899+.
22	Crawford-Pocatello-Ogden-Cheyenne-Crawford.	- 145.3	- 90.0	- 235.3	5592	-0.080	1899+.
23	Savanna-St. Paul-Sioux City-Kansas City-Jefferson City-Twelve miles above St. Louis-Grafton-Savanna.	+ 341.4	- 101.7	+ 239.7	2981	+0.080	Eng., 1899+.
24	Smithland-Vidalia-Concordia-Jonesville-Barbin Landing-Smithland.	- 27.2	+ 0.1	- 27.1	312	-0.087	Eng.
25	Cincinnati-Louisville-Georgetown-Cincinnati.	- 51.5	+ 11.2	- 40.3	414	-0.088	Eng., G. S. 1905+, 1899+.
26	Abilene-Norfolk-Crawford-Cheyenne-Denver-Limon-Abilene.	+ 170.3	-382.0	- 211.7	2378	-0.089	1899+, 1899-.
27	Boston-Greenbush-Poughkeepsie-Sandy Hook.	- 64.4	+ 4.8	- 59.6	667	-0.089	Van O., 1899+, 1899-.
28	Georgetown-Louisville-Shawneetown-Cairo-Corinth-Tuscumbia-Decatur-Chattanooga-Harriman-Georgetown.	- 220.1	+ 55.0	- 165.1	1759	-0.094	Eng., 1899+, G. S. 1905+.
29	Vicksburg-Wilkersons Landing-Monroe-Rayville-Vicksburg.	+ 52.4	+ 0.7	+ 53.1	530	+0.10	Eng., 1899-.
30	Cincinnati-Deshler-Trenton-Sand Beach-Chicago-Pekin-Oakland-Terre Haute-Mitchell-Cincinnati.	+ 236.4	+ 13.8	+ 250.2	2424	+0.10	Water, 1899+, G. S. 1905+, 1899-, Eng., Lake.
31	Warwick-Buffalo-Trenton-Deshler-Warwick..	- 123.7	+ 2.5	- 121.2	1141	-0.11	Water, 1899+, Lake, B. & O., Eng. Wye, Geol.
32	Brainerd-Aitkin-Grand Rapids-Cass Lake-Brainerd.	+ 45.5	- 2.0	+ 43.5	400	+0.11	Eng.
33	Escanaba-Detour-Marquette-Escanaba.....	+ 89.3	- 6.0	+ 83.3	753	+0.11	Water, Lake.
34	Washington - Relay - Washington Junction - Washington.	- 22.0	- 2.1	- 24.1	213	-0.11	B. & O.
35	Cincinnati-Portsmouth-Chillicothe-Cincinnati.	+ 57.6	- 0.6	+ 57.0	497	+0.11	Eng. Wye, 1899-, G. S. 1905+.
36	Wilkersons Landing-Little Rock-Camden-Parkville-Wilkersons Landing.	+ 86.6	+ 0.0	+ 86.6	684	+0.13	Eng., 1899-.
37	Grafton-Benwood-Belpre-Grafton.....	- 66.2	+ 5.3	- 60.9	470	-0.13	1899-, B. & O., Eng. Wye.
38	Boston-Greenbush-Oswego-Buffalo-Trenton-Sand Beach-Detour-Marquette-St. Paul-Sioux City-Norfolk-Crawford-Pocatello-Seattle.	- 1117.9	+ 95.9	- 1022.0	7656	-0.13	1899+, Water.
39	Monroe-Shreveport-Barbin Landing-Jonesville-Columbia-Monroe.	- 96.6	- 2.1	- 98.7	698	-0.14	Eng.
40	Utica-Oswego-Charlotte-Hornellsville-Elmira-Bainbridge-Utica.	- 110.5	+ 4.4	- 106.1	713	-0.15	Geol., Lake, Water.
41	Fort Worth-El Reno-Belen-Fort Worth.....	+ 691.2	-284.1	+ 407.1	2664	+0.15	1899+.
42	Morehead City-Knoxville-Cleveland-Brunswick.	+ 324.0	- 58.0	+ 266.0	1674	+0.16	Geol., 1899+.
43	Biloxi-Meridian-Vicksburg-Vidalia-Smithland-Biloxi.	- 204.2	+ 7.6	- 196.6	1191	-0.17	Eng., 1899-.
44	Sandy Hook-Poughkeepsie-Hancock-Binghamton-Elmira-Harrisburg-Sandy Hook.	- 185.3	- 20.6	- 205.9	1218	-0.17	Geol., 1899-, P. R. R.
45	Mitchell-Terre Haute-Vincennes-Mitchell.....	+ 67.8	+ 2.7	+ 70.5	401	+0.17	Eng., G. S. 1905+, 1899-.
46	St. Louis-Jefferson City-Harrisonville-Little Rock-Wilkersons Landing-Memphis-Cairo-St. Louis.	+ 457.6	- 67.8	+ 389.8	2211	+0.18	1899-, Eng.
47	Pittsburgh-Monaca-Benwood-Benton Ferry-Pittsburgh.	+ 86.0	+ 0.6	+ 86.6	488	+0.18	Geol., Eng., Wye, B. & O.
48	Harrisburg-Pittsburgh-Cumberland-Hancock-Hagerstown-Harrisburg.	- 150.6	- 11.5	- 162.1	902	-0.18	P. R. R., B. & O., 1899-.
49	Galveston-Fort Worth-El Paso-Belen-Goffs-San Diego.	- 981.0	+337.8	- 643.2	3561	-0.18	1899+.
50	Brunswick-Cleveland-Chattanooga-Decatur-Meridian-Biloxi.	- 301.8	+ 8.9	- 292.9	1617	-0.18	Geol., 1899+, 1899-, Eng.

Closing errors of circuits—Continued.

No.	Circuit.	Circuit closure.	Ortho-metric correction.	Corrected closure.	Circumference of circuit.	Closure per kilometer.	Character of lines.
		<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>km.</i>	<i>mm.</i>	
51	Old Point Comfort-Washington-Washington Junction - Hancock - Cumberland - Amblersburg - Grafton - Belpre - Portsmouth - Cincinnati-Georgetown - Harriman - Knoxville-Morehead City.	+ 628.7	-101.7	+ 527.0	2821	+0.19	Geol., 1899+, 1899-, B. & O., Eng., Wye.
52	Knoxville-Harriman-Chattanooga-Cleveland-Knoxville.	- 78.8	+ 1.0	- 77.8	389	-0.20	1899+, G. S. 1905+.
53	Cumberland - Pittsburgh - Grafton - Amblersburg-Cumberland.	+ 133.8	+ 7.7	+ 141.5	648	+0.22	B. & O., Geol., 1899-.
54	Kansas City-Pleasant Hill-Jefferson City-Kansas City.	- 120.9	- 3.8	- 124.7	551	-0.23	Eng., 1899-.
55	Pittsburgh-Ellwood City-Monaca-Pittsburgh.	- 34.2	+ 1.4	- 32.8	140	-0.23	B. & O., Eng., Wye, 1899+, Geol.
56	Monroe-Columbia-Archibald - Rayville - Monroe.	- 40.7	0.0	- 40.7	168	-0.24	Eng.
57	Oswego-Olcott-Buffalo-Salamanca - Hornellsville-Charlotte-Oswego.	+ 186.8	+ 1.3	+ 188.1	766	+0.25	Geol., Water, Lake.
58	Baltimore-Relay-Washington-Annapolis.	+ 32.6	- 0.7	+ 31.9	120	+0.25	1899-, B. & O., 1899+.
59	Vicksburg-Greenwood-Greenville-Vicksburg.	- 130.6	+ 0.6	- 130.0	469	-0.28	Eng., 1899-, Geol., 1899+ Lake.
60	Greenbush-Bainbridge-Hancock - Poughkeepsie-Greenbush.	+ 207.7	- 33.4	+ 174.3	613	+0.28	Geol., 1899+, Lake.
61	Irinetou-Leboeuf-Franklin-Irinetou.	- 70.7	+ 0.6	- 70.1	241	-0.29	Geol.
62	Corinth-Cairo-Memphis-Corinth.	+ 237.0	+ 6.6	+ 243.6	746	+0.33	1899-, Eng.
63	Louisville-Mitchell - Vincennes-Shawneetown-Louisville.	- 278.1	+ 2.6	- 275.5	808	-0.34	Eng., 1899-, G. S., 1905+.
64	Shreveport-Camden - Little Rock - Harrisonville - Holliday - Abilene - El Reno - Fort Worth-Shreveport.	- 864.8	- 75.9	- 940.7	2586	-0.36	1899+, 1899-, Eng.
65	Vincennes-Olney - Odin - Duquoin - Shawneetown-Vincennes.	- 200.5	- 2.1	- 202.6	538	-0.38	Eng., 1899-, G. S., 1905+.
66	Cairo-Duquoin-Odin-St. Louis-Cairo.	+ 227.2	+ 3.4	+ 230.6	573	+0.40	Eng., 1899-.
67	Shawneetown-Duquoin-Cairo-Shawneetown.	- 176.7	- 1.9	- 178.6	422	-0.42	Eng., 1899-, G. S., 1905+.
68	Terre Haute - Oakland - Olney - Vincennes - Terre Haute.	- 166.2	- 2.2	- 168.4	383	-0.44	Eng., G. S., 1905+, 1899-.
69	St. Louis - Odin - Olney-Oakland-Pekin-Grafton-St. Louis.	+ 380.6	+ 10.0	+ 390.6	862	+0.45	Eng., 1899+, 1899-.
70	Decatur - Tusculumbia - Corinth-Meridian-Decatur.	- 427.2	+ 8.5	- 418.7	800	-0.49	1899+, 1899-, Eng.
71	Sandy Hook - Harrisburg - Hagerstown-Washington-Relay-Baltimore.	- 304.5	- 17.5	- 322.0	644	-0.50	1899-, B. & O., 1899+.
72	Cincinnati-Mitchell-Louisville-Cincinnati.	- 275.6	- 5.3	- 280.9	521	-0.54	Eng., 1899-, G. S., 1905.
73	Irinetou-Salamanca-Buffalo-Leboeuf-Irinetou.	- 292.7	+ 9.6	- 283.1	448	-0.63	Geol., Water.
74	Monaca-Ellwood City-Alliance-Monaca.	+ 148.3	- 2.1	+ 146.2	228	+0.64	P. R. R., 1899+, B. & O.
75	Uhrichsville - Zanesville - Marietta - Benwood-Uhrichsville.	+ 315.0	- 1.7	+ 313.3	462	+0.68	Eng., Wye, G. S., 1905+, B. & O.
76	Meridian-Corinth-Memphis-Wilkersons Landing-Vicksburg-Meridian.	+ 900.3	+ 11.0	+ 911.3	1280	+0.71	1899-, Eng.
77	Cumberland-Hancock-Cumberland.	- 136.6	+ 0.3	- 136.3	184	-0.74	1899-, B. & O.
78	Limon-Denver-Limon.	- 292.1	- 8.6	- 300.7	385	-0.78	1899.
79	Washington - Hagerstown-Hancock-Washington Junction-Washington.	+ 280.4	- 1.9	+ 278.5	345	+0.81	1899-, B. & O.
80	Annapolis-Washington-Old Point Comfort.	- 378.5	- 5.1	- 383.6	396	-0.97	1899-.
81	Cumberland-Amblersburg-Cumberland.	- 253.3	+ 1.1	- 252.2	233	-1.08	B. & O., 1899-.
82	Pleasant Hill-Kansas City-Holliday-Harrisonville-Pleasant Hill.	+ 183.1	0.0	+ 183.1	165	+1.11	1899-.
83	St. Augustine-Cedar Keys.	- 258.5	- 0.7	- 259.2	216	-1.20	1899-, Van O.
84	Grafton-Amblersburg-Grafton.	- 189.6	- 0.5	- 190.1	96	-1.98	1889-, B. & O.

METHODS EMPLOYED IN THE 1912 ADJUSTMENTS.

When extensive additions are made to the precise level net of the country a readjustment of the net must be made in order to obtain the best practicable elevations of bench marks and to eliminate the differences in the elevation of a bench mark which is on several lines of levels. Theoretically the best method of procedure is to readjust the entire net and not to hold fixed any elevations resulting from the previous adjustment. This method, however, is impracticable, for the surveyors, engineers, and others whose operations are based on the elevations furnished by the precise leveling, wish to have the elevations used in any particular case held as fixed for an indefinite period or for all time.

The following plan was adopted in the present (1912) adjustment: First, the orthometric correction was applied to the leveling to the westward of the Mississippi River; second, an adjustment of the entire net was made, using the weights for the different classes of leveling as determined by the 1907 adjustment. (See p. 72, *Precise Leveling in the United States, 1903-1907.*) Then a comparison was made of the elevations resulting from the adjustments in 1907 and in 1912, which showed that the 1907 elevations of bench marks eastward from the imagi-

nary line joining the following places might be held: Shreveport, La.; Little Rock, Ark.; St. Louis, Mo.; Savanna, Ill.; and Marquette, Mich.

Sixty-nine junction points in the net were held, and of these only fourteen had a difference of more than one decimeter (0.33 foot) between the 1907 values and those of this preliminary 1912 adjustment. The junction points at which the difference is as great as one decimeter are located in Illinois, Indiana, Michigan, northwestern Ohio, and southwestern Wisconsin.

THE 1912 SPECIAL ADJUSTMENT.

A special adjustment was then made which included that portion of the net to the westward of the imaginary line mentioned above. The elevations of the following bench marks were held fixed: Mean sea level, with elevation of zero, at Seattle and San Diego, on the Pacific coast, and at Galveston on the Gulf coast; and the elevations of P. B. M. 46 at Shreveport, La.; No. 1 or 3 at Little Rock, Ark.; K₃ at St. Louis, Mo.; P. B. M. 62 at Savanna, Ill.; 1 (1871) at Marquette, Mich., as adopted in Precise Leveling in the United States 1903-1907.

The observation equations were formed from 35 observed differences of elevations with the orthometric correction applied between the junction points and the fixed points and between each two adjacent junction points. These observation equations are shown in the table on page 75.

This is a different procedure from that followed in 1907. In that adjustment all of the net was adjusted as a whole and then certain of the previously adjusted elevations (adjustment of 1903) were held, a correction of so much per kilometer being applied to a line of levels joining a bench mark whose elevation was held and the one nearest to it whose elevation resulted from the 1907 adjustment.

The elevations in the western part of the country, resulting from the special adjustment (for sake of clearness called the *1912 special adjustment*) and those held from the 1907 adjustment in the eastern part of the country to the eastward of the imaginary line mentioned above, are assumed to be *standard* elevations and are expected to be held without change. It is believed that the precise leveling net is sufficiently extended and of such strength that this may be done and that any new leveling in the future can be fitted to the standard elevations. It is possible that changes may have to be made in restricted portions of the net where elevations have been changed by earthquakes or other agencies, or if a mistake is found in an already adjusted line. Such changes will probably be very few in number and will not make it inadvisable to classify the 1912 elevation, as *fixed* or *standard*. The elevations from future leveling which will be fitted to the standard elevations will also be given that designation.

From time to time adjustments of the whole net will be made in order to obtain the theoretically best values for the junction points. The results of such adjustments will probably have a scientific value and interest only and should not be confused with the standard values. The results from such a general adjustment made in 1912 are shown on pages 81 to 82.

The general adjustment of 1912, which gives the theoretically best values for the junction points of the entire net, showed that in the 1912 special adjustment the weights for the classes of levels 1 and 2 are too large. (See pp. 76 and 79.)

After the best weights from the 1912 general adjustment were found, they were used in a second special adjustment of that portion of the net west of the Mississippi River, and the resulting elevations of the junction points together with the standard elevations of the same points are shown in the following table. This comparison shows only six differences each greater than one decimeter, and these are nearly all at the junction points which are between the old leveling which had been given small weight and the new leveling of great weight. The relative differences in elevation between any two contiguous bench marks would be practically the same by using either system of weights. A great amount of work had been done toward getting the results of the 1912 special adjustment ready for publication before the theoretically best weights were obtained from the 1912 general adjustment. It was decided that it was

inadvisable to supersede that work. The difference between the corrections per kilometer for the two adjustments is only 0.3 millimeter in the worst case, namely, the line between Jefferson City and Pleasant Hill, and in only 8 of the 35 relative differences was it greater than 0.15 millimeter per kilometer. The average difference in the corrections by the two adjustments was only 0.09 millimeter per kilometer.

A comparison between the standard and the theoretically best elevations of junction points is shown in the table on pages 81 and 82.

The 1912 special adjustments were made by the same methods as the adjustment of 1907. The 35 links, or equations of observed differences between two points known as junction points, or else between either sea level or one of the fixed points (on the eastern boundary of the territory covered) and one junction point, are shown as observation equations in the table below. Each observation equation bears the same number in the adjustment as in the general adjustment and is formed from the same data, except those equations involving a fixed point on the eastern boundary. (See pp. 74 and 76-79.)

Observation equations in the 1912 special adjustment.

No. of equation or link.	Observed difference.	Weight.
20	Harrisonville No. 43—Little Rock No. 1 or 3.....	+ 230.0737 0.0033
21	Pleasant Hill No. LI—Harrisonville No. 43.....	— 48.3144 9.6
22A	Kansas City Old M. R. C. B. M. 244—Holliday No. LXIII.....	— 2.9355 3.0
22B	Holliday No. LXIII—Harrisonville No. 43.....	— 76.4081 0.28
22E	Abilene Y ₂ —Norfolk N ₁	— 113.3063 6.4
22F	Abilene Y ₂ —Holiday No. LXIII.....	+ 117.7747 0.028
22H	Limon N—Abilene Y ₂	+ 1281.3715 0.0047
22I	Denver A ₂ —Limon N.....	— 47.1601 0.083
22J	Denver A ₂ —Limon N.....	— 47.4608 0.027
23	Kansas City Old M. R. C. B. M. 244—Pleasant Hill No. LI.....	— 31.2112 0.77
24	Jefferson City Old B. M. 90 (85)—Pleasant Hill No. LI.....	— 91.3154 0.042
25	Kansas City Old M. R. C. B. M. 244—Jefferson City Old B. M. 90 (85).....	+ 60.2200 1.6
26	St. Louis K ₂ —Jefferson City Old B. M. 90 (85).....	— 43.5512 0.038
27	St. Louis K ₂ —Jefferson City Old B. M. 90 (85).....	— 43.8279 2.1
56	Denver A ₂ —Cheyenne B.....	— 262.4208 18.0
57A	Cheyenne B—Crawford G ₄	+ 726.1522 7.4
57B	Norfolk N ₁ —Crawford G ₄	+ 657.4283 5.3
58A	Cheyenne B—Ogden B.....	+ 536.8017 3.7
58B	Ogden B—Pocatello B ₂	+ 49.9520 14.0
58C	Pocatello B ₂ —Seattle sea level.....	+ 1360.0994 2.3
59	Norfolk N ₁ —Sioux City P. B. M. 399.....	+ 123.9961 26.0
60	Sioux City P. B. M. 399—Kansas City Old M. R. C. B. M. 244.....	+ 105.0363 1.0
61	St. Paul P. B. M. 68—Sioux City P. B. M. 399.....	— 120.8009 2.0
62	Marquette 1 (1871)—St. Paul P. B. M. 68.....	— 28.3198 1.5
64A	St. Paul P. B. M. 68—Savanna P. B. M. 62.....	+ 33.7924 1.0
64B	Abilene Y ₂ —El Reno 1327 Reno Junction.....	— 54.5787 6.6
65	El Reno 1327 Reno Junction—Fort Worth U.....	+ 220.3769 8.8
66	Fort Worth U—Shreveport P. B. M. 46.....	+ 124.9933 7.3
94	Fort Worth U—Galveston sea level.....	+ 184.7126 4.9
95	Pocatello B ₂ —Crawford G ₄	+ 239.5398 2.0
96	Ogden B—Goffs L ₂	+ 523.4866 3.1
97	Goffs L ₂ —San Diego, sea level.....	+ 786.6356 5.0
98	Belen U. S. G. S. 4793—Goffs L ₂	+ 674.3299 3.0
99	Belen U. S. G. S. 4793—El Reno 1327 Reno Junction.....	+ 1056.1121 3.1
	Belen U. S. G. S. 4793—Fort Worth U.....	+ 1276.8961 2.2

WEIGHTS USED IN THE 1912 SPECIAL ADJUSTMENT.

In the 1912 special adjustment above, the weights assigned to the different classes of leveling were the same as those used in the 1907 adjustment and are:

Class.	Lines.	Weight p.
1	Coast and Geodetic Survey leveling of 1899 and later; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations.....	$\frac{3000}{L}$
2	Engineer lines with Kern instrument, and wye levels run under the direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways.....	$\frac{500}{L}$
6	Coast and Geodetic Survey leveling previous to 1899.....	$\frac{1600}{L^2}$

ELEVATIONS RESULTING FROM THE 1912 SPECIAL ADJUSTMENT.

The following table gives the elevations of the 19 junction points resulting from the use of the two scales of weights:

Junction point.	Elevations.		Differ- ence.	Junction point.	Elevations.		Differ- ence.
	1907 weights used.	1912 weights used.			1907 weights used.	1912 weights used.	
	<i>Meters.</i>	<i>Meters.</i>	<i>mm.</i>		<i>Meters.</i>	<i>Meters.</i>	<i>mm.</i>
Pocatello B ₂	1360.3278	1360.3623	+ 34.5	Abilene Y ₂	350.4667	350.6011	+134.4
Ogden B.....	1310.3635	1310.4054	+ 41.9	El Reno 1327 Reno Junction.....	405.0611	405.1381	+ 77.0
Goffs L ₂	786.7998	786.8070	+ 7.2	Fort Worth U.....	184.6681	184.7078	+ 39.7
Crawford G ₂	1121.0399	1121.1720	+132.1	St. Paul P. B. M. 68.....	214.1977	214.3144	+116.7
Cheyenne B.....	1847.1831	1847.2834	+100.3	Holliday No. LXIII.....	232.9184	233.0157	+ 97.3
Denver A ₂	1584.7622	1584.8620	+ 99.8	Kansas City Old M. R. C. B. M. 244.....	229.9730	230.0701	+ 97.1
Limon N.....	1631.9971	1632.0921	+ 95.0	Pleasant Hill No. LI.....	261.1451	261.2399	+ 94.8
Belen U. S. G. S. 4793.....	1461.2516	1461.3022	+ 50.6	Harrisonville No. 43.....	309.4501	309.5510	+ 94.9
Sioux City P. B. M. 399.....	334.7831	334.9858	+202.7	Jefferson City Old B. M. 90 (85).....	199.8979	199.9292	+ 35.3
Norfolk N ₁	463.7560	463.9363	+180.3				

LINES FITTED TO THE LEVEL NET.

The following lines were fitted to the level net in Illinois, Indiana, and Kentucky:

From Cincinnati, Ohio, to Cairo, Ill., United States Engineers.

From Terre Haute, Ind., to mouth of Wabash River, United States Engineers.

From Georgetown, Ky., to Louisville, Ky., United States Geological Survey.

From Louisville, Ky., to Mitchell, Ind., United States Geological Survey.

From Mitchell, Ind., to Oakland, Ill., United States Geological Survey.

From Shawneetown, Ill., to Duquoin, Ill., United States Geological Survey.

THE GENERAL ADJUSTMENT OF 1912.

This adjustment was made to obtain the theoretically best values for the various junction points of the entire net of precise leveling in the United States. The mean sea level was considered to have zero elevation at each of the following tidal stations: Sandy Hook, N. J., Biloxi, Miss., Galveston, Tex., San Diego, Cal., Seattle, Wash., Baltimore, Md., Morehead City, N. C., and Brunswick, Ga. The first five tidal stations are strongly connected with the net. The connection with the station at Baltimore is of only moderate strength, while the connection between the net and the tidal stations at Morehead City and Brunswick is comparatively weak.

The various lines composing the net are shown on the sketch opposite page 58.

The general adjustment of 1912 involves 173 links and 84 circuits. The adjustment of 1907 involved 148 links and 71 circuits; that of 1903, 106 links and 48 circuits; and that of 1899, 54 links and 25 circuits. This indicates that the net of 1912 is much stronger than that of any one of the preceding adjustments.

COMPOSITION OF OBSERVATION EQUATIONS.

The adjustment was made by the same methods as that of 1907. The 173 links, or equations, of observed differences of elevation between two points, known as junction points, or between mean sea level and one such point, are shown as observation equations in the table on pages 77-79. For equations which are unchanged from the adjustment of 1907 the previous numbering has been retained. The lines shown on pages 59-71, which are used in making up each equation, are indicated in the following table:

Link or equation.	Lines forming equations. [See pp. 59-71.]	Link or equation.	Lines forming equations. [See pp. 59-71.]	Link or equation.	Lines forming equations. [See pp. 59-71.]	Link or equation.	Lines forming equations. [See pp. 59-71.]
1A	29A, 144, 145, 146.	6D	83A, 249.	12A	90, 91, 44, 43.	16D	153.
4B	147, 247.	7A	77, 81A.	13A	90, 91, 92, 43.	17	46, 45.
5B	74A, 74B.	7B	81B, 79.	14A	65, 43.	18A	88A.
5C	74D.	7C	250.	15	29A, 30, 31.	18B	88B, 86, 75.
5D	74E.	8A	248.	16	32.	18C	251.
6A	80A.	9	89, 85, 86, 75.	16A	100, 101, 149, 150.	19	96, 93.
6B	80B.	10	77, 76, 75.	16B	151.	20	55, 54, 53, 52, 51, 49, 48.
6C	80C, 79.	11A	78.	16C	152.	21	56.

Link or equation.	Lines forming equations. [See pp. 59-71.]	Link or equation.	Lines forming equations. [See pp. 59-71.]	Link or equation.	Lines forming equations. [See pp. 59-71.]	Link or equation.	Lines forming equations. [See pp. 59-71.]
22A	15A, 15B.	37C	168.	47J	257, 258.	75	169C.
22B	57A, 15B.	37E	169A, 141A.	48	3.	76	169D, 169E.
22E	70A.	38B	118.	49B	59A, 59B.	77	167A.
22F	16, 17A.	39A	195.	50	1, 2.	78	167B, 6A.
22H	23, 22, 21, 20, 17A.	39C	196, 197.	51A	211.	79	166A.
22I	27, 28.	39D	112.	51B	213, 212.	80	166B.
22J	27, 26, 25, 24.	40A	198, 199.	52A	133A, 133B, 133C, 133D,	81	273.
23	14, 13, 12.	40B	200, 201.		133E, 133F, 133G,	82	270, 272.
24	10, 11.	40C	202.		133H.	83	269.
25	14, 121.	40D	203, 204.	53	135.	84	169E, 274.
26	9.	41A	206, 207.	54B	170B.	85	227, 275, 141A.
27	105, 120, 10.	42A	209, 210.	54C	170A, 1.	86	141A, 276.
28	103.	43A	138A, 215.	55	219, 228, 229.	87	278, 279.
29	33, 66.	43B	138B.	56	175.	88	281, 192B, 193, 208.
30	35, 34, 33.	43C	217, 216.	57A	173A, 174.	89	190A.
31	104, 35.	43D	138C.	57B	158, 171, 172, 173B.	90	277, 290.
32A	36A.	43E	138D, 138E.	58A	176, 234, 237A.	91	282.
32B	36B.	43F	218, 219.	58B	237B.	92	283.
33A	110, 108, 106B, 107.	43G	138F, 213.	58C	238, 239.	93A	284, 285A.
33B	107, 106A, 105.	44A	140B, 140A, 214.	59	156, 155, 154.	93B	285B.
34	8.	44B	140C.	60	122, 123, 124.	94	287, 291, 294, 295.
35C	205, 71, 72C.	44C	220.	61	181A, 240, 242, 243.	95	288, 290, 292, 293.
35D	72D.	44D	221.	62	194, 116.	96	288, 289.
35F	7B.	44E	222.	63	113.	97	297, 301, 304.†
35G	6A, 7C.	44F	140D, 141A.	64A	17A, 178, 179, 180B.	98	296, 300.
35H	7D.	45A	141A, 143A, 143B, 143C,	64B	180A, 187.	99	299, 302.
35I	7E.		143D.*	65	186.	100	314.
36C	160.	45B	143D, 223, 224.	66	231, 233A, 244, 246.	101	6A, 305.
36D	161, 162, 163.	46B	141A, 142B, 261.	67	4E.	102	308, 316.
36F	163, 164A.	47B	4B.	68	259.	103	306, 308.
36G	164B, 165.	47C	4C.	69	4D.	104	307.
36H	157B.	47D	226.	70	260.	105	313.
36I	157A.	47F	225B.	71	261, 262.	106	315.
36J	189.	47G	225A.	72	263.	107	312.
36K	6A, 159A.	47H	255.	73	264.	108	309, 310.
36L	158, 159B.	47I	256.	74	265, 266, 267, 268.	109	311.

* The mean was taken at Blairsville intersection of 141A and 143A, and 141A and 143B.

† Mean of No. 301 and No. 304 was used in the adjustment.

All the leveling by the Coast and Geodetic Survey previous to 1899 was corrected for a systematic error before using it to form observation equations. The formula for systematic error derived in 1899 (see pp. 442-444, 446, Appendix 8, Report for 1899) was again used, as the evidence indicated that a new computation of the constants of this formula would give values agreeing closely with the values there given. These corrections for systematic error are shown in the table on pages 84-85.

Each observed difference in the following table is the directly observed difference corrected for systematic error and orthometric correction.

Observation equations, general adjustment of 1912.

No. of equation or link.	Observed difference.	Adjusted difference.	Correc- tion v.	Weight p.	prob.	
		Meters.	Meters.	mm.		
1A	Smithland P. B. M. XLV—Biloxisea level.....	+ 14.8235	+ 14.7729	- 50.6	0.39	999
4B	Vidalia LXIV—Smithland P. B. M. XLV.....	+ 5.0717	+ 5.0427	- 29.0	1.3	1093
5C	Monroe P. B. M. 27—Shreveport P. B. M. 46.....	- 35.8766	- 35.8434	+ 33.2	1.1	1212
5D	Shreveport P. B. M. 46—Barbin Landing T. B. M. 53.....	+ 35.4809	+ 35.5465	+ 65.6	0.48	2066
5E	Barbin Landing T. B. M. 53—Smithland P. B. M. XLV.....	+ 9.3546	+ 9.3627	+ 8.1	2.2	144
6A	Monroe P. B. M. 27—Columbia T. B. M. 137.....	+ 5.5991	+ 5.6100	+ 10.9	2.5	297
6B	Columbia T. B. M. 137—Jonesville P. B. M. 4.....	+ 1.7171	+ 1.7142	- 2.9	1.9	16
6C	Jonesville P. B. M. 4—Vidalia LXIV.....	- 3.3032	- 3.3011	+ 2.1	3.8	17
6D	Jonesville P. B. M. 4—Barbin Landing T. B. M. 53.....	- 7.6132	- 7.6211	- 7.9	1.7	106
7A	Rayville P. B. M. 16—Archibald P. B. M. Archibald.....	+ 1.0505	+ 1.0442	- 6.3	10.0	397
7B	Archibald P. B. M. Archibald—Vidalia LXIV.....	+ 3.7034	+ 3.6818	- 21.6	1.4	653
7C	Archibald P. B. M. Archibald—Columbia T. B. M. 137.....	+ 5.2807	+ 5.2687	- 12.0	2.7	839
8A	Vicksburg SW. Base—Vidalia LXIV.....	+ 6.9100	+ 6.8945	- 15.5	1.0	240
9	Wilkersons Landing P. B. M. 84—Monroe P. B. M. 27.....	+ 18.4746	+ 18.4911	+ 16.5	0.76	207
10	Rayville P. B. M. 16—Monroe P. B. M. 27.....	+ 0.6914	+ 0.7029	+ 11.5	4.4	582
11A	Vicksburg SW. Base—Rayville P. B. M. 16.....	+ 2.1750	+ 2.1685	- 6.5	1.9	80
12A	Wilkersons Landing P. B. M. 84—Vicksburg SW. Base.....	+ 15.6932	+ 15.6197	- 73.5	0.046	249
13A	Wilkersons Landing P. B. M. 84—Vicksburg SW. Base.....	+ 15.6851	+ 15.6197	- 65.4	0.50	2139
14A	Meridian C—Vicksburg SW. Base.....	+ 77.9776	+ 78.2393	+ 261.7	0.032	2192
15	Meridian C—Biloxisea level.....	+ 105.1911	+ 104.9494	- 241.7	0.016	935
16	Corinth V—Meridian C.....	+ 32.6611	+ 32.7424	+ 81.3	0.01	100
16A	Decatur P. B. M. 50—Meridian C.....	+ 64.7134	+ 64.7222	+ 8.8	0.396	30
16B	Tuscumbia P. B. M. 9—Corinth V.....	+ 5.5678	+ 5.5658	- 2.0	1.7	7
16C	Decatur P. B. M. 50—Tuscumbia P. B. M. 9.....	+ 26.4114	+ 26.4140	+ 2.6	1.7	11
16D	Decatur P. B. M. 50—Tuscumbia P. B. M. 9.....	+ 26.4178	+ 26.4140	- 3.8	2.1	30
17	Little Rock No. 1 or 3—Wilkersons Landing P. B. M. 84.....	+ 38.1357	+ 38.0777	- 58.0	0.048	161
18A	Little Rock No. 1 or 3—Camden P. B. M. Camden IV.....	+ 45.2834	+ 45.2825	- 0.9	0.81	1
18B	Camden P. B. M. Camden IV—Monroe P. B. M. 27.....	+ 11.2852	+ 11.2863	+ 1.1	0.81	1
18C	Camden P. B. M. Camden IV—Shreveport P. B. M. 46.....	- 24.5553	- 24.5571	- 1.8	0.82	1
19	Memphis P. B. M. Memphis—Wilkersons Landing P. B. M. 84.....	+ 38.2705	+ 38.2304	- 40.1	0.52	839

Observation equations, general adjustment of 1912—Continued.

No. of equation or link.	Observed difference.	Adjusted difference.	Correc- tion v .	Weight p .	$p\sigma$.	
	Meters.	Meters.	mm.			
20	Harrisonville No. 43—Little Rock No. I or 3.....	+ 230.0737	+ 229.0234	- 1050.3	0.0033	3640
21	Pleasant Hill No. LI—Harrisonville No. 43.....	+ 48.3144	+ 48.3111	+ 3.3	9.6	105
22A	Kansas City Old M. R. C. B. M. 244—Holiday No. LXIII.....	- 2.9355	- 2.9459	+ 10.4	3.0	324
22B	Holiday No. LXIII—Harrisonville No. 43.....	- 76.4081	- 76.5347	+ 126.6	0.28	4488
22E	Abilene Y ₂ —Norfolk N ₁	+ 113.3063	+ 113.3124	- 6.1	0.32	12
22F	Abilene Y ₂ —Holiday No. LXIII.....	+ 117.7747	+ 117.6258	+ 148.9	0.028	621
22H	Limon N—Abilene Y ₂	+ 1281.3715	+ 1281.5068	+ 135.3	0.0047	86
22I	Denver A ₂ —Limon N.....	- 47.1601	- 47.2285	+ 68.4	0.083	388
22J	Denver A ₂ —Limon N.....	- 47.4608	- 47.2285	+ 232.3	0.027	1457
23	Kansas City Old M. R. C. B. M. 244—Pleasant Hill No. LI.....	- 31.2112	- 31.1695	+ 41.7	0.77	1359
24	Jefferson City Old B. M. 90 (85)—Pleasant Hill No. LI.....	- 91.3154	- 91.3160	+ 0.6	5.042	0
25	Kansas City Old M. R. C. B. M. 244—Jefferson City Old B. M. 90 (85).....	+ 60.2200	+ 60.1465	- 73.5	0.49	2647
26	St. Louis K ₂ —Jefferson City Old B. M. 90 (85).....	- 43.5512	- 43.7557	+ 204.5	0.098	1589
27	St. Louis K ₂ —Jefferson City Old B. M. 90 (85).....	- 43.8279	- 43.7557	+ 72.2	0.61	3180
28	Cairo P. B. M. 2—Memphis P. B. M. Memphis.....	+ 16.7064	+ 16.6719	- 34.5	0.45	536
29	Corinth V—Memphis P. B. M. Memphis.....	+ 57.1981	+ 57.1316	- 66.5	0.070	310
30	Cairo P. B. M. 2—Corinth V.....	- 40.4649	- 40.4597	+ 5.2	0.022	1
31	St. Louis K ₂ —Cairo P. B. M. 2.....	+ 28.8537	+ 28.8190	- 37.7	0.55	782
32A	Odin No. V—Duquoin R ₂	+ 19.7888	+ 19.8357	+ 46.9	0.32	704
32B	Duquoin R ₂ —Cairo P. B. M. 2.....	+ 43.4963	+ 43.5452	+ 48.9	0.11	263
33A	Savanna P. B. M. 62—Grafton (Ill.) P. B. M. 2.....	+ 50.1727	+ 50.2103	+ 37.6	0.28	396
33B	Grafton (Ill.) P. B. M. 2—St. Louis K ₂	+ 4.0785	+ 4.0787	+ 0.2	2.2	0
34	Odin No. V—St. Louis K ₂	+ 34.4653	+ 34.5649	+ 99.6	0.15	1488
35C	Trenton (1877)—Deshler I ₁	- 33.4281	- 33.4308	+ 2.7	1.1	8
35D	Deshler I ₁ —Cincinnati T.....	+ 50.7550	+ 50.7291	- 25.6	0.55	369
35F	Olney B ₂ —Odin No. V.....	- 12.8095	- 12.6728	+ 136.7	0.22	4111
35G	Mitchell X—Cincinnati T.....	+ 42.8601	+ 42.6242	- 235.9	0.055	3061
35H	Mitchell X—Vincennes No. 1.....	- 78.2843	- 78.3496	+ 65.3	0.14	597
35I	Olney B ₂ —Vincennes No. 1.....	+ 17.0688	+ 17.1393	+ 70.5	0.59	2932
36C	Knoxville 933 MC—Harriman C ₂	+ 42.5944	+ 42.6015	+ 7.1	1.9	96
36D	Morehead City sea level—Knoxville 933 MC.....	- 284.2055	- 284.1467	+ 58.8	0.027	93
36F	Knoxville 933 MC—Cleveland 875 MC.....	+ 17.8344	+ 17.7716	- 62.8	0.19	749
36G	Cleveland 875 MC—Brunswick sea level.....	+ 266.6371	+ 266.3751	- 262.0	0.035	2403
36H	Harriman C ₂ —Chattanooga 698 N.....	- 30.3036	- 30.3056	+ 2.0	1.2	5
36I	Chattanooga 698 N—Decatur P. B. M. 50.....	+ 41.5684	+ 41.5680	- 0.4	0.77	0
36J	Chattanooga 698 N—Cleveland 875 MC.....	- 55.1414	- 55.1355	+ 5.9	0.48	17
36K	Cincinnati T—Georgetown W.....	- 100.7581	- 100.7752	+ 17.1	1.4	409
36L	Harriman C ₂ —Georgetown W.....	- 25.7788	- 25.7563	+ 22.5	0.50	253
37C	Grafton (W. Va.) M—Belpre No. XL.....	+ 114.4413	+ 114.4243	- 17.0	0.056	16
37E	Pittsburg P. R. R. 90—Monaca 25 C.....	+ 17.4722	+ 17.4751	+ 2.9	2.5	21
38B	Escanaba 1 (1874)—Marquette 1 (1871).....	- 5.1364	- 5.1193	+ 17.1	1.4	409
39A	Escanaba 1 (1874)—Sand Beach U. S. B. M. E.....	- 3.1498	- 3.1223	+ 27.5	0.30	227
39C	Sand Beach U. S. B. M. E—Chicago P. B. M. 99.....	- 2.6226	- 2.5552	+ 67.4	0.18	818
39D	Chicago P. B. M. 99—Savanna P. B. M. 62.....	- 0.2064	- 0.1874	+ 19.0	0.67	242
40A	Marquette 1 (1871)—Detour, Goetz.....	+ 2.3942	+ 2.4354	+ 41.2	0.41	696
40B	Escanaba 1 (1874)—Detour, Goetz.....	- 2.6544	- 2.6839	+ 29.5	0.53	461
40C	Detour Goetz—Sand Beach U. S. B. M. E.....	+ 5.8042	+ 5.8062	+ 2.0	0.58	2
40D	Sand Beach U. S. B. M. E—Trenton (1877).....	- 6.2001	- 6.2301	+ 30.0	0.64	576
41A	Trenton (1877)—Buffalo L. H.....	+ 4.0858	+ 4.0395	- 46.3	0.35	750
42A	Buffalo L. H.—Oswego A.....	+ 103.0937	+ 103.0628	- 30.9	0.58	554
43A	Salamanca 1391 D—Buffalo L. H.....	+ 244.1403	+ 244.2829	+ 142.6	0.18	3660
43B	Hornellsville 1141 D—Salamanca 1391 D.....	- 75.9152	- 75.8885	+ 26.7	0.18	128
43C	Oswego A—Hornellsville 1141 D.....	- 271.5069	- 271.4572	+ 49.7	0.17	420
43D	Elmira 857 A—Hornellsville 1141 D.....	- 86.4967	- 86.5109	+ 14.2	0.26	52
43E	Bainbridge 989 A—Elmira 857 A.....	+ 39.9607	+ 39.9618	+ 1.1	0.16	0
43F	Utica L. S. 92—Bainbridge 989 A.....	- 170.4504	- 170.4779	+ 27.5	0.24	182
43G	Greenbush Gristmill—Bainbridge 989 A.....	- 297.3877	- 297.4242	+ 36.5	0.14	187
44A	Leboeuf 1193 Pittsburg (1899)—Buffalo L. H.....	+ 184.2194	+ 184.1556	- 63.8	0.65	2646
44B	Franklin 987 Pittsburg (1899)—Leboeuf 1193 Pittsburg (1899).....	- 62.8152	- 62.8091	+ 60.9	0.27	2381
44C	Irvine 1167 D—Leboeuf 1193 Pittsburg (1899).....	+ 7.9570	+ 7.9993	+ 42.3	0.38	680
44D	Irvine 1167 D—Franklin 987 Pittsburg (1899).....	+ 54.9283	+ 54.9098	- 18.5	0.29	89
44E	Salamanca 1391 D—Irvine 1167 D.....	+ 68.1610	+ 68.1266	- 34.4	0.61	722
44F	Pittsburg P. R. R. 90—Franklin 987 Pittsburg (1899).....	- 74.2480	- 74.3771	+ 129.1	0.16	2667
45A	Harrisburg No. XXIX—Pittsburg P. R. R. 90.....	- 118.0154	- 117.9089	+ 106.5	0.057	647
45B	Elmira 857 A—Harrisburg No. XXIX.....	+ 152.8755	+ 152.9230	+ 47.5	0.080	180
46B	Pittsburg P. R. R. 90—Grafton (W. Va.) M.....	- 77.1337	- 77.0499	+ 83.8	0.12	843
47B	Hancock F—Cumberland I.....	- 61.7906	- 61.8967	+ 106.1	0.18	2026
47C	Hagerstown A—Hancock F.....	+ 40.0505	+ 40.0548	- 23.7	0.64	359
47D	Hancock F—Cumberland I.....	- 61.9467	- 61.8007	+ 50.0	0.20	500
47F	Washington Capitol B. M.—Washington Jct. B. & O. 44 A.....	- 43.4746	- 43.4625	+ 12.1	0.26	88
47G	Washington Jct. B. & O. 44 A—Hancock F.....	- 57.2026	- 57.1721	+ 30.5	0.20	186
47H	Relay B. & O. 31—Washington Capitol B. M.....	- 5.7291	- 5.7500	+ 20.9	0.38	166
47I	Relay B. & O. 31—Washington Jct. B. & O. 44 A.....	- 49.2278	- 49.2125	+ 15.3	0.19	44
47J	Relay B. & O. 31—Baltimore sea level.....	+ 21.8572	+ 21.8605	+ 3.3	1.5	16
48	Harrisburg No. XXIX—Hagerstown A.....	- 59.4914	- 59.5263	+ 34.9	0.12	146
49B	Hagerstown A—Washington Capitol B. M.....	+ 140.5322	+ 140.6614	+ 129.2	0.085	1419
50	Sandy Hook sea level—Harrisburg No. XXIX.....	- 108.6672	- 108.7456	+ 78.4	0.022	135
51A	Utica L. S. 92—Oswego A.....	+ 54.4144	+ 54.4302	+ 15.8	1.1	275
51B	Greenbush Gristmill—Utica L. S. 92.....	- 126.9593	- 126.9463	+ 13.0	0.83	140
52A	Oswego A—Greenbush Gristmill.....	+ 72.5759	+ 72.5161	- 59.8	0.15	536
53	Boston sea level—Greenbush Gristmill.....	- 4.2848	- 4.2062	+ 78.6	0.072	445
54B	Greenbush Gristmill—Poughkeepsie 173 A.....	- 48.5030	- 48.5098	+ 6.8	1.3	60
54C	Poughkeepsie 173 A—Sandy Hook sea level.....	+ 52.7282	+ 52.7160	- 12.2	1.7	253
55	Bainbridge 989 A—Poughkeepsie 173 A.....	+ 249.0590	+ 248.9144	- 144.6	0.052	1715
56	Denver A ₂ —Cheyenne B.....	- 262.4208	- 262.4214	+ 0.6	0.89	0
57A	Cheyenne B—Crawford G ₁	+ 726.1522	+ 726.1226	- 29.6	0.37	324
57B	Norfolk N ₁ —Crawford G ₁	- 657.4283	- 657.2647	+ 163.6	0.26	6959
58A	Cheyenne B—Ogden B.....	+ 536.8017	+ 536.8568	+ 55.1	0.19	577
58B	Ogden B—Pocatello B ₂	- 49.9520	- 49.9588	+ 6.8	0.69	32
59C	Pocatello B ₂ —Seattle sea level.....	+ 1360.0994	+ 1360.3237	+ 224.3	0.12	6037
59	Norfolk N ₁ —Seattle sea level.....	+ 128.9961	+ 128.9620	- 34.1	1.3	1512
60	Sioux City P. B. M. 399—Kansas City Old M. R. C. B. M. 244.....	- 105.0363	- 104.9221	+ 114.2	0.31	4043
61	St. Paul P. B. M. 68—Sioux City P. B. M. 399.....	- 120.8009	- 120.7499	+ 51.0	0.17	442
62	Marquette 1 (1871)—St. Paul P. B. M. 68.....	- 28.3198	- 28.2864	+ 33.4	0.21	234
63	St. Paul P. B. M. 68—Savanna P. B. M. 62.....	+ 53.7924	+ 53.7854	- 7.0	0.31	15
64A	Abilene Y ₂ —El Reno 1327 Reno Junction.....	- 54.5787	- 54.5596	+ 19.1	0.38	131
64B	El Reno 1327 Reno Junction—Fort Worth U.....	+ 220.3769	+ 220.4168	+ 39.9	0.44	700

Observation equations, general adjustment of 1912—Continued.

No. of equation or link.	Observed difference.	Adjusted difference.	Correc-tion v.	Weight p.	pv^2 .	
		Meters.	Meters.	mm.		
65	Fort Worth U—Shreveport P. B. M. 46.....	+ 124.9933	+ 124.9827	- 10.6	0.37	41
66	Fort Worth U—Galveston sea level.....	+ 184.7126	+ 184.6648	- 47.8	0.24	548
67	Cumberland I—Amblersburg L.....	- 304.8581	- 304.7803	+ 77.8	0.12	726
68	Cumberland I—Amblersburg L.....	- 304.6654	- 304.7803	- 114.9	0.15	1060
69	Amblersburg L—Grafton (W. Va.) M.....	+ 191.1625	+ 191.2177	+ 55.2	0.69	2102
70	Amblersburg L—Grafton (W. Va.) M.....	+ 191.3386	+ 191.2177	- 120.9	0.38	5554
71	Grafton (W. Va.) M—Benwood U. S. E. 94 A.....	+ 106.1391	+ 106.1618	+ 22.7	0.14	72
72	Benwood U. S. E. 94 A—Uhrichsville B. & O. 48.....	- 65.0135	- 65.1964	- 182.9	0.17	5687
73	Uhrichsville B. & O. 48—Warwick B. & O. 449.....	- 29.3675	- 29.3541	+ 13.4	0.24	43
74	Warwick B. & O. 449—Deshler I.....	+ 74.8779	+ 74.8377	- 40.2	0.28	452
75	Monaca 25 C—Benwood U. S. E. 94 A.....	+ 11.6198	+ 11.6368	+ 17.0	0.90	280
76	Benwood U. S. E. 94 A—Belpre No. XL.....	+ 8.2007	+ 8.2625	+ 61.8	0.80	3055
77	Belpre No. XL—Portsmouth U. S. E.....	+ 26.1638	+ 26.2016	+ 37.8	0.37	529
78	Portsmouth U. S. E.—Cincinnati T.....	- 3.4840	- 3.4478	+ 36.2	0.54	708
79	Belpre No. XL—Chillicothe Q.....	- 5.1464	- 5.1470	- 0.6	0.064	0
80	Chillicothe Q—Cincinnati T.....	+ 27.9843	+ 27.9008	- 83.5	0.064	446
81	Portsmouth U. S. E.—Chillicothe Q.....	+ 31.3456	+ 31.3486	+ 3.0	1.9	17
82	Chillicothe Q—Zanesville U. S. E. 1.....	- 18.6156	- 18.6161	- 0.5	0.89	0
83	Zanesville U. S. E. 1—Uhrichsville B. & O. 48.....	- 49.7222	- 49.6958	+ 26.4	1.3	906
84	Belpre No. XL—Zanesville U. S. E. 1.....	- 23.8053	- 23.7631	+ 42.2	0.82	1460
85	Cumberland I—Pittsburg P. R. R. 90.....	- 36.4939	- 36.5127	- 18.8	0.074	26
86	Pittsburg P. R. R. 90—Ellwood City B. & O. 349.....	- 44.7276	- 44.6967	+ 30.9	0.25	239
87	Ellwood City B. & O. 349—Monaca 25 C.....	+ 62.1670	+ 62.1718	+ 4.8	5.8	134
88	Warwick B. & O. 449—Buffalo L. H.....	+ 112.2669	+ 112.3080	+ 41.1	0.25	422
89	Monaca 25 C—Alliance Br. 66.....	- 124.9380	- 124.8411	+ 96.9	0.21	1972
90	Ellwood City B. & O. 349—Alliance Br. 66.....	- 62.6248	- 62.6693	- 44.5	0.46	911
91	Pekin P. B. M. 49—Grafton (Ill.) P. B. M. 2.....	+ 8.5124	+ 8.4957	- 16.7	0.60	167
92	Chicago P. B. M. 90—Pekin P. B. M. 49.....	+ 41.5284	+ 41.5272	- 1.2	0.52	1
93A	Pekin P. B. M. 49—Oakland C.....	- 60.2490	- 60.2343	- 14.7	0.65	140
93B	Oakland C—Olney B.....	+ 50.8569	+ 50.9166	+ 59.7	1.2	4277
94	Pocahontas B—Crawford G.....	+ 239.5398	+ 239.2246	- 315.2	0.10	1003
95	Ogden B—Goffs L.....	+ 523.4866	+ 523.5807	+ 94.1	0.16	1417
96	Goffs L—San Diego sea level.....	+ 786.6356	+ 786.7842	+ 148.6	0.25	5520
97	Belen U. S. G. S. 4793—Goffs L.....	+ 674.3299	+ 674.4769	+ 147.0	0.15	3241
98	Belen U. S. G. S. 4793—El Reno 1327 Reno Junction.....	+ 1056.1121	+ 1056.1795	+ 67.4	0.16	727
99	Belen U. S. G. S. 4793—Fort Worth U.....	+ 1276.8961	+ 1276.5963	- 299.8	0.11	9887
100	Mitchell X—Louisville U. S. E. B. M. 604 M.....	+ 78.0875	+ 78.0609	- 26.6	1.5	1061
101	Louisville U. S. E. B. M. 604 M—Cincinnati T.....	- 35.4239	- 35.4367	- 12.8	0.86	141
102	Vincennes No. 1—Shawneetown P. B. M. Station.....	+ 24.3858	+ 24.4327	+ 46.9	0.69	1518
103	Louisville U. S. E. B. M. 604 M—Shawneetown Station.....	+ 24.8277	+ 24.7214	- 106.3	0.39	4407
104	Shawneetown P. B. M. Station—Cairo P. B. M. 2.....	+ 9.1361	+ 9.1361	0.0	0.81	0
105	Oakland C—Terre Haute U. S. G. S. 513.....	+ 42.8087	+ 42.7829	- 25.8	2.4	1598
106	Terre Haute U. S. G. S. 513—Vincennes No. 1.....	+ 25.2914	+ 25.2730	- 18.4	1.0	339
107	Terre Haute U. S. G. S. 513—Mitchell X.....	- 53.0330	- 53.0766	- 43.6	1.0	1901
108	Louisville U. S. E. B. M. 604 M—Georgetown W.....	- 136.2223	- 136.2119	+ 10.4	1.2	130
109	Shawneetown P. B. M. Station—Duquoin R.....	- 34.4018	- 34.4091	- 7.3	1.3	69

DISCUSSION OF WEIGHTS.

Before beginning the adjustment the question of what relative weights should be assigned to the different classes of leveling was again carefully considered. The same criterion for determining these relative weights that had been used in 1899, 1903, and 1907 was again used—that is, that after the adjustment is made the average value of pv^2 for each of the groups into which the leveling is divided with respect to assigned weights should be as nearly as possible the same.

The weights used in the final solution of the 1907 adjustment were assigned for the first trial solution. In the following tables, L is the length of the link in kilometers.

Weights used in first trial solution.

Class.	Lines.	Number of equations.	Weight p.	Average pv^2 .
1	Coast and Geodetic Survey leveling of 1899 and later; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations.....	52	$\frac{3000}{L}$	15566
2	Engineer lines with Kern instrument; and wye levels run under the direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways.....	47	$\frac{500}{L}$	4263
3	United States Geological Survey leveling previous to 1905, and Van Orden leveling.....	20	$\frac{24}{L}$	1467
4	Leveling by the Pennsylvania R. R. Co.....	3	$\frac{20}{L}$	1522
5	Leveling by the Baltimore & Ohio R. R. Co.....	16	$\frac{18}{L}$	1475
6	Coast and Geodetic Survey leveling previous to 1899.....	35	$\frac{1600}{L^2}$	1815
	Average value of pv^2 from all lines.....			6548

It is evident from this that the weights assigned to classes 1 and 2 are very much too large, while the weights assigned to the last four classes are relatively correct. A second trial solution was then made in which the weights of all leveling in class 1 and the Engineer lines with Kern instruments in class 2 were reduced to $\frac{300}{L}$. The remainder of the leveling in class 2 was reduced to $\frac{100}{L}$, while classes 3, 4, 5, and 6 were held at their former values.

This solution gave the following result:

Weights used in second trial solution.

Class.	Lines.	Number of equations.	Weight p .	Average pv^2 .
1	Coast and Geodetic Survey leveling of 1899 and later; Engineer lines with Kern instrument; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations.....	92	$\frac{300}{L}$	1905
2	Wye levels run under the direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways.....	7	$\frac{100}{L}$	1013
3	United States Geological Survey leveling previous to 1905, and Van Orden leveling.....	20	$\frac{24}{L}$	933
4	Leveling by the Pennsylvania R. R. Co.....	3	$\frac{20}{L}$	975
5	Leveling by the Baltimore & Ohio R. R. Co.....	16	$\frac{18}{L}$	1083
6	Coast and Geodetic Survey leveling previous to 1899.....	35	$\frac{1600}{L^2}$	1247
	Average value of pv^2 from all lines.....			1531

This indicates that a still further reduction of the weight of class 1 is necessary and that the weights of the other classes are relatively correct. Another solution was made in which the weight of class 1 was reduced to $\frac{150}{L}$, the weights of the other classes not being changed. These are the adopted weights which were used in the final adjustment of the level net of 1912.

Weights used in the general adjustment of 1912.

Class.	Lines.	Number of equations.	Weight p .	Average pv^2 .
1	Coast and Geodetic Survey leveling of 1899 and later; Engineer lines with Kern instrument; United States Geological Survey leveling of 1905 and later; United States Lake Survey leveling, and water leveling on lakes, except short series of observations.....	92	$\frac{150}{L}$	1031
2	Wye levels run under direction of the Corps of Engineers, United States Army, and Board of Engineers on Deep Waterways.....	7	$\frac{100}{L}$	938
3	United States Geological Survey leveling previous to 1905, and Van Orden leveling.....	20	$\frac{24}{L}$	1004
4	Leveling by the Pennsylvania R. R. Co.....	3	$\frac{20}{L}$	933
5	Leveling by the Baltimore & Ohio R. R. Co.....	16	$\frac{18}{L}$	1046
6	Coast and Geodetic Survey leveling previous to 1899.....	35	$\frac{1600}{L^2}$	1101
	Average value of pv^2 from all lines.....			1038

These average values of pv^2 are so nearly equal that any change in the assigned weights is not warranted.

The formation of normal equations by the method of least squares and their solution gave the adjusted elevations shown in the table on pages 81-82. For the purpose of showing clearly the effects of the orthometric correction and the new lines the elevations as adjusted in 1907 are also placed in the table and the differences (1912 minus 1907) are shown.

The resulting probable error of an observation of unit weight is ± 32.6 millimeters—that is, this is the probable error of the observed difference of elevation on the two ends of a line

of such a length as to be assigned unit weight; for instance, 150 kilometers of leveling of the class 1 to which was assigned leveling of the Coast and Geodetic Survey of 1899 and later; of the United States Engineer's lines with Kern instruments; of the United States Geological Survey in 1905 and later; and of the United States Lake Survey. This probable error of ± 32.6 millimeters for an observation of unit weight corresponds to a probable error of ± 2.66 millimeters for 1 kilometer of leveling of class 1. This probable error is larger than the one obtained by using the formula adopted by the Seventeenth General Conference of the International Geodetic Association. (See p. 88.) This difference clearly indicates the presence of systematic errors in the leveling. Another indication of the presence of systematic errors is the fact that the average pv^2 for lines more than 400 kilometers in length is 3000, while the average pv^2 for shorter lines is only 250.

ELEVATION OF JUNCTION POINTS.

In the following table are given the adjusted and adopted values of the elevation of the junction points from the adjustments of 1907 and 1912.

In the fourth column is given the difference between the two adjusted values, showing the effect of the introduction of the new leveling and the orthometric correction into the level net. These differences in the eastern part of the country are due almost entirely to the introduction of the orthometric correction, while those in the central and western parts of the country are due to a combination of the new leveling, the orthometric correction, and a meter error in the 1907 net near Cheyenne, Wyo.

The elevations given in the sixth column result from the 1912 special adjustment. (See p. 76.) The absence of an elevation in this column signifies that the junction point did not enter into the 1912 special adjustment and that the standard elevation is the same as the 1907 adopted elevation.

All junction points introduced into the net for the first time in this adjustment are indicated by italics.

Table of elevations of junction points.

Junction point.	Adjusted elevation (general adjustment).			Adopted elevation.		
	1907	1912	Difference.	1907	1912 standard.	Difference.
	m.	m.	mm.	m.	m.	mm.
Smithland, P. B. M. XLV.....	14. 8127	14. 7729	- 39. 8	14. 8127		
Vidalia, LXIV.....	19. 8617	19. 8156	- 46. 1	19. 8617		
Barbin Landing, T. B. M. 53.....	24. 1793	24. 1356	- 43. 7	24. 1793		
Jonesville, P. B. M. 4.....	16. 5610	16. 5145	- 46. 5	16. 5610		
Columbia, T. B. M. 137.....	18. 2787	18. 2287	- 50. 0	18. 2787		
Monroe, P. B. M. 27.....	23. 8916	23. 8387	- 52. 9	23. 8916		
Shreveport, P. B. M. 46.....	59. 7386	59. 6821	- 56. 5	59. 7386		
Fort Worth, U.....	184. 7369	184. 6648	- 72. 1	184. 7280	184. 6681	- 59. 9
Archibald, P. B. M. Archibald.....	23. 5477	23. 4974	- 50. 3	23. 5477		
Rayville, P. B. M. 16.....	24. 5926	24. 5416	- 51. 0	24. 5926		
Vicksburg, SW. base.....	26. 7594	26. 7101	- 49. 3	26. 7594		
Meridian, C.....	104. 8489	104. 9494	+100. 5	104. 8587		
Decatur, P. B. M. 50.....	169. 5845	169. 6716	+ 87. 1	169. 5959		
Tuscumbia, P. B. M. 9.....	143. 1694	143. 2576	+ 88. 2	143. 1832		
Harriman, C.....	241. 4796	241. 5452	+ 65. 6	241. 4888		
Chattanooga, 698N.....	211. 1590	211. 2396	+ 80. 6	211. 1690		
Knoxville, 933 M. C.....	284. 0746	284. 1467	+ 72. 1	284. 0848		
Cleveland, 875 M. C.....	266. 3004	266. 3751	+ 74. 7	266. 3100		
Wilkersons Landing P. B. M. 84.....	42. 3907	42. 3298	- 60. 9	42. 3907		
Camden, P. B. M. Camden IV.....	35. 1840	35. 1250	- 59. 0	35. 1840		
Little Rock, No. I or 3.....	80. 4742	80. 4075	- 66. 7	80. 4742		
Harrisonville, No. 43.....	309. 6134	309. 4309	-182. 5	309. 6134	309. 4561	-167. 3
Pleasant Hill, No. LI.....	261. 3053	261. 1198	-185. 5	261. 3053	261. 1451	-160. 2
Holliday, No. LXIII.....	233. 0889	232. 8962	-192. 7	233. 0889	232. 9184	-170. 5
Kansas City, old M. R. C. B. M. 244.....	230. 1447	229. 9503	-194. 4	230. 1447	229. 9730	-171. 7
Cheyenne, B.....	1847. 5070	1847. 2217	-285. 3	1847. 5070	1847. 1831	-323. 9
Denver, A.....	1584. 8873	1584. 8003	- 87. 0	1584. 8873	1584. 7622	-125. 1
Limon, N.....	1632. 0507	1632. 0288	- 21. 9	1632. 0507	1631. 9971	- 53. 6
Abilene, Y.....	350. 7139	350. 5220	-191. 9	350. 7139	350. 4667	-247. 2
Norfolk, N.....	464. 1507	463. 8344	-316. 3	464. 1507	463. 7560	-394. 7
Sioux City, P. B. M. 399.....	335. 1723	334. 8724	-299. 9	335. 1723	334. 7831	-389. 2
St. Paul, P. B. M. 68.....	214. 4346	214. 1225	-312. 1	214. 4346	214. 1977	-236. 9
Jefferson City, old B. M. 90 (85).....	169. 9766	169. 8038	-172. 8	169. 9869	169. 8939	- 93. 0
Memphis, P. B. M. Memphis.....	80. 6435	80. 5602	- 83. 3	80. 6435		
Corinth, V.....	137. 6047	137. 6918	+ 87. 1	137. 6187		
Cafo, P. B. M. 2.....	97. 3460	97. 2321	-113. 9	97. 3258		
St. Louis, K.....	126. 2001	126. 0481	-152. 0	126. 1776		

Table of elevations of junction points—Continued.

Junction point.	Adjusted elevation (general adjustment).			Adopted elevation.		
	1907	1912	Difference.	1907	1912 standard.	Difference.
Grafton, P. B. M. 2.	130. 2875	130. 1268	-160. 7	130. 2823		
Savanna, P. B. M. 62.	180. 5801	180. 3371	-229. 0	180. 5371		
Chicago, P. B. M. 99.	180. 3701	180. 1497	-220. 4	180. 3077		
Pekin, P. B. M. 49.	138. 8128	138. 6225	-190. 3	138. 8128		
Olney, B.	148. 1688	147. 9402	-228. 6	148. 1688		
Odin, No. V.	160. 8293	160. 6130	-216. 3	160. 8293		
Cincinnati, T or City B. M. No. 1.	166. 5833	166. 5283	-57. 0	166. 5849		
Marquette, I (1871).	186. 1200	185. 8361	-283. 9	186. 0774		
Escanaba, I (1874).	180. 9716	180. 7168	-254. 8	180. 9320		
Detour, Goetz.	183. 6392	183. 4007	-238. 5	183. 6017		
Sand Beach, U. S. B. M. E.	177. 7968	177. 5945	-202. 3	177. 7620		
Trenton (1877).	183. 9643	183. 8246	-139. 7	183. 9457		
Deshler, I.	217. 3779	217. 2554	-122. 5	217. 3654		
Warwick, B. & O. 449.	292. 1888	292. 0931	-95. 7	292. 1003		
Uhrichsville, B. & O. 48.	262. 8218	262. 7390	-82. 8	262. 8218		
Zanesville, U. S. E. 1.	213. 0912	213. 0432	-48. 0	213. 0912		
Chillicothe, Q.	194. 4632	194. 4271	-36. 1	194. 4632		
Portsmouth, U. S. E.	163. 1077	163. 0785	-29. 2	163. 1077		
Belpre, No. XL.	189. 2904	189. 2801	-10. 3	189. 2904		
Benwood, U. S. E. 94A.	197. 5211	197. 5426	+ 21. 5	197. 5211		
Monaca, 25C.	209. 1593	209. 1794	+ 20. 1	209. 2284		
Alliance, Br. 66.	334. 0015	334. 0205	+ 19. 0	334. 0706		
Ellwood City, B. & O. 349.	271. 3305	271. 3512	+ 20. 7	271. 3996		
Leboeuf, 1193 Pittsburgh (1899).	364. 0038	363. 9407	-63. 1	363. 9900		
Franklin, 987 Pittsburgh (1899).	301. 0623	301. 0316	-30. 7	301. 0750		
Irvineton, 1167D.	355. 9928	355. 9414	-51. 4	355. 9911		
Pittsburgh, P. R. R. 99.	226. 6279	226. 6545	+ 26. 6	226. 6992		
Grafton, W. Va., M.	303. 6738	303. 7044	+ 30. 6	303. 6738		
Amblerburg, L.	494. 8938	494. 9221	+ 28. 3	494. 8938		
Hancock, F.	128. 2339	128. 2451	+ 11. 2	128. 2339		
Cumberland, I.	190. 1244	190. 1418	+ 17. 4	190. 1244		
Washington Junction, B. & O. 44A.	71. 0660	71. 0730	+ 7. 0	71. 0660		
Washington, Capitol B. M.	27. 6033	27. 6105	+ 7. 2	27. 6409		
Relay, B. & O. 31.	21. 8587	21. 8605	+ 1. 8	21. 8587		
Hagerstown, A.	168. 2605	168. 2719	+ 11. 4	168. 2605		
Harrisburg, No. XXIX.	108. 7402	108. 7456	+ 5. 4	108. 7402		
Elmira, 857A.	261. 7017	261. 6686	-33. 1	261. 7098		
Hornellsville, 1141D.	348. 2297	348. 1795	-50. 2	348. 2288		
Salamanca, 1391D.	424. 1298	424. 0680	-61. 8	424. 1256		
Buffalo, L. H.	179. 8788	179. 7851	-93. 7	179. 8630		
Bainbridge, 989A.	301. 6547	301. 6304	-24. 3	301. 6531		
Poughkeepsie, 173A.	52. 7297	52. 7160	-13. 7	52. 7276		
Utica, L. S. 92.	131. 1957	131. 1525	-43. 2	131. 1893		
Oswego, A.	76. 7879	76. 7223	-65. 6	76. 7788		
Greenbush, gristmill.	4. 2294	4. 2062	-23. 2	4. 2255		
* El Reno, 1327 Reno Junction.		405. 0816		405. 0611		
Crawford, G.		1121. 0991		1121. 0399		
Pocatello, B.		1860. 3237		1860. 3278		
Ogden, B.		1310. 3649		1310. 3685		
Goff, L.		788. 7842		788. 7998		
Belen, U. S. G. S. 4793.		1461. 2611		1461. 2516		
Georgetown, W.		267. 8015		267. 8251		
Louisville, U. S. E. B. M. 604 M.		131. 0896		131. 1752		
Mitchell, X.		209. 1505		209. 3099		
Terre Haute, U. S. G. S. 513.		156. 0739		156. 2590		
Vincennes, No. 1.		130. 8009		131. 0424		
Oakland, C.		198. 8568		199. 0415		
Shawneetown, P. B. M. Station.		106. 5682		106. 5382		
Duquoin, R.		140. 7773		140. 9633		

* The following bench marks are on the lines used in the 1907 adjustment, but did not appear as junction points; their elevations, as obtained from that adjustment by the usual method (see p. 57), are as follows:

El Reno, 1327 Reno Junction.	405. 1786	Ogden, B.	1309. 7019	Vincennes, No. 1.	131. 1209
Crawford, G.	1121. 5968	Georgetown, W.	267. 3214	Oakland, C.	199. 0415
Pocatello, B.	1359. 8535	Mitchell, X.	209. 4321	Duquoin, R.	146. 9633

DYNAMIC NUMBERS.

On pages 49 to 53 are discussed the orthometric and dynamic corrections which must be applied to the observed differences in elevation in a net to make the results accordant. The elevations of junction points resulting from the 1912 general adjustment which are given in the above table are what are termed orthometric elevations.

In the table below are given the orthometric elevation for each of the junction points, the dynamic corrections for elevation and latitude, and the resulting dynamic number.

In addition there are shown in the table the dynamic numbers for a number of bench marks at the highest and lowest points of some level lines, and also at a few points of decided change in grade. For the method of obtaining the orthometric elevations which are needed in computing the dynamic numbers of the additional points, see page 57.

Comparison of orthometric elevations and dynamic numbers.

Place and bench mark.	Latitude. ϕ	Orthometric elevation. h .	Dynamic correction for latitude. $-D_h$.	Dynamic correction for elevation. $-D_h^2$.	Total dynamic correction.	Dynamic number. H .
<i>Junction points.</i>		<i>Meters.</i>				<i>Metric units.</i>
Smithland, La., P. B. M. XLV	30 55	14.7729	-0.0184	-0.0000	-0.0184	14.7545
Vidalia, La., LXIV	31 35	19.8156	-0.0236	-0.0001	-0.0237	19.7919
Barbin Landing, La., T. B. M. 53	31 09	24.1356	-0.0296	-0.0001	-0.0297	24.1059
Jonesville, La., P. B. M. 4	31 37	16.5145	-0.0196	-0.0000	-0.0196	16.4949
Columbia, La., T. B. M. 137	32 05	18.2287	-0.0210	-0.0001	-0.0211	18.2076
Monroe, La., P. B. M. 27	32 29	23.8387	-0.0266	-0.0001	-0.0267	23.8120
Shreveport, La., P. B. M. 46	32 30	59.6821	-0.0666	-0.0006	-0.0672	59.6149
Fort Worth, Tex., U	32 45	184.6648	-0.2022	-0.0053	-0.2075	184.4573
Archibald, La., P. B. M. Archibald	32 20	23.4974	-0.0266	-0.0001	-0.0267	23.4707
Rayville, La., P. B. M. 16	32 28	24.5416	-0.0275	-0.0001	-0.0276	24.5140
Vicksburg, Miss., S. W. Base	32 20	26.7101	-0.0302	-0.0001	-0.0303	26.6798
Meridian, Miss., C	32 22	104.9494	-0.1185	-0.0017	-0.1202	104.8292
Decatur, Ala., P. B. M. 50	34 36	169.6716	-0.1588	-0.0045	-0.1633	169.5083
Tuscumbia, Ala., P. B. M. 9	34 43	143.2576	-0.1329	-0.0032	-0.1361	143.1215
Harriman, Tenn., C	35 56	241.5452	-0.1986	-0.0091	-0.2077	241.3375
Chattanooga, Tenn., 698 N.	35 03	211.2396	-0.1899	-0.0070	-0.1969	211.0427
Knoxville, Tenn., 933 MC	35 58	284.1467	-0.2328	-0.0127	-0.2455	283.9012
Cleveland, Tenn., 875 MC	35 09	266.3751	-0.2372	-0.0111	-0.2483	266.1268
Wilkersons Landing, Miss., P. B. M. 84	33 35	42.3298	-0.0434	-0.0003	-0.0437	42.2861
Camden, Ark., P. B. M. IV	33 35	35.1250	-0.0360	-0.0002	-0.0362	35.0888
Little Rock, Ark., 3 or No. I	34 44	80.4075	-0.0745	-0.0010	-0.0755	80.3320
Harrisonville, Mo., No. 43	38 40	309.4309	-0.1793	-0.0150	-0.1943	309.2366
Pleasant Hill, Mo., No. LI	39 47	261.1198	-0.1485	-0.0107	-0.1592	260.9606
Holliday, Kans., No. LXIII	39 02	232.8962	-0.1273	-0.0085	-0.1358	232.7604
Kansas City, Mo., Old M. R. C. B. M. 244	39 07	229.9503	-0.1239	-0.0083	-0.1322	229.8181
Cheyenne, Wyo., B	41 08	1847.2217	-0.6569	-0.0370	-1.1939	1846.0278
Denver, Colo., A	39 45	1584.8903	-0.7631	-0.3949	-1.1580	1583.6422
Limon, Colo., N	39 16	1632.0288	-0.8571	-0.4192	-1.2763	1630.7525
Abilene, Kans., Y	38 55	350.5220	-0.1952	-0.0193	-0.2145	350.3075
Norfolk, Nebr., N	42 01	463.8344	-0.1274	-0.0339	-0.1613	463.6731
Sioux City, Iowa, P. B. M. 399	42 32	334.8724	-0.0761	-0.0177	-0.0938	334.7786
St. Paul, Minn., P. B. M. 68	44 57	214.1225	-0.0010	-0.0072	-0.0082	214.1143
Jefferson City, Mo., Old B. M. 90 (85)	38 35	169.8038	-0.0997	-0.0045	-0.1042	169.6996
Memphis, Tenn., P. B. M. Memphis	35 09	80.5602	-0.0717	-0.0010	-0.0727	80.4875
Corinth, Miss., V	34 56	137.6918	-0.1252	-0.0030	-0.1282	137.5636
Cairo, Ill., P. B. M. 2	37 00	97.2321	-0.0708	-0.0015	-0.0723	97.1598
St. Louis, Mo., K	38 37	126.0481	-0.0737	-0.0025	-0.0762	125.9719
Grafton, Ill., P. B. M. 2	38 58	130.1268	-0.0719	-0.0027	-0.0746	130.0522
Savanna, Ill., P. B. M. 63	42 06	180.3371	-0.0482	-0.0051	-0.0533	180.2838
Chicago, Ill., P. B. M. 99	41 53	180.1497	-0.0517	-0.0051	-0.0568	180.0929
Pekin, Ill., P. B. M. 49	40 34	138.6225	-0.0565	-0.0030	-0.0595	138.5630
Olney, Ill., B	38 44	147.9402	-0.0848	-0.0035	-0.0883	147.8519
Odin, Ill., V	38 37	160.6130	-0.0938	-0.0041	-0.0979	160.5151
Cincinnati, Ohio, T	39 06	166.5263	-0.0900	-0.0043	-0.0943	166.4320
Marquette, Mich., 1 (1871)	46 33	185.8361	+0.0265	-0.0054	+0.0211	185.8572
Escanaba, Mich., 1 (1874)	45 44	180.7168	+0.0122	-0.0051	+0.0071	180.7239
Detour, Mich., Goetz	45 59	183.4007	+0.0166	-0.0053	+0.0113	183.4120
Sand Beach, Mich., U. S. B. M. E	44 02	177.5945	+0.0158	-0.0050	+0.0108	177.5737
Trenton, Mich. (1877)	42 09	183.8246	-0.0483	-0.0053	-0.0536	183.7710
Deshler, Ohio, I	41 12	217.2554	-0.0759	-0.0074	-0.0833	217.1721
Warwick, Ohio, B. & O. 49	40 55	292.0831	-0.1097	-0.0134	-0.1231	291.9700
Uhrichsville, Ohio, B. & O. 48	40 24	262.7390	-0.1110	-0.0109	-0.1219	262.6171
Zanesville, Ohio, U. S. E. 1	39 56	213.0432	-0.0991	-0.0071	-0.1062	212.9370
Chillicothe, Ohio, Q	39 20	194.4271	-0.1010	-0.0059	-0.1069	194.3202
Portsmouth, Ohio, U. S. E	38 44	163.0785	-0.0835	-0.0042	-0.0977	162.9808
Belpre, Ohio, No. XL	39 17	189.2801	-0.0962	-0.0050	-0.1043	189.1753
Benwood, W. Va., U. S. E. 94 A	40 01	197.5426	-0.0904	-0.0061	-0.0965	197.4461
Monaca, Pa., 25 C	40 41	209.1794	-0.0980	-0.0069	-0.0989	209.0895
Alliance, Ohio, Br. 66	40 55	334.0205	-0.1254	-0.0176	-0.1430	333.8775
Ellwood City, Pa., B. & O. 349	40 51	271.3512	-0.1035	-0.0116	-0.1151	271.2361
Leboen, Pa., 1193 Pittsburgh (1899)	41 55	363.9407	-0.1033	-0.0208	-0.1241	363.8166
Franklin, Pa., 987 Pittsburgh (1899)	41 24	301.0316	-0.0997	-0.0143	-0.1140	300.9176
Irvinton, Pa., 1167 D	41 50	355.9414	-0.1038	-0.0199	-0.1237	355.8177
Pittsburgh, Pa., P. R. R. 99	40 26	226.6545	-0.0951	-0.0081	-0.1032	226.5513
Grafton, W. Va., M	39 20	303.7044	-0.1577	-0.0145	-0.1722	303.5322
Amblersburg, W. Va., L	39 23	494.9221	-0.2548	-0.0386	-0.2934	494.6287
Hancock, W. Va., F	39 42	128.2451	-0.0623	-0.0026	-0.0649	128.1802
Cumberland, Md., I	39 39	190.1418	-0.0933	-0.0057	-0.0990	190.0428
Washington Junction, Md., B. & O. 44 A	39 17	71.0730	-0.0672	-0.0008	-0.0680	71.0050
Washington, D. C., Capitol B. M	38 53	27.6105	-0.0155	-0.0001	-0.0156	27.5949
Relay, Md., B. & O. 31	39 13	21.8605	-0.0116	-0.0001	-0.0117	21.8488
Hagerstown, Md., A	39 38	168.2719	-0.0828	-0.0045	-0.0873	168.1846
Harrisburg, Pa., No. XXIX	40 16	108.7456	-0.0473	-0.0019	-0.0492	108.6964
Elmira, N. Y., 857 A	42 05	261.6686	-0.0702	-0.0108	-0.0810	261.5876
Hornellsville, N. Y., 1141 D	42 20	348.1795	-0.0856	-0.0191	-0.1047	348.0748
Salamanca, N. Y., 1391 D	42 10	424.0680	-0.1107	-0.0283	-0.1390	423.9290
Buffalo, N. Y., L. H.	42 52	179.7851	-0.0354	-0.0051	-0.0405	179.7446
Bainbridge, N. Y., 989 A	42 18	301.6304	-0.0750	-0.0143	-0.0893	301.5411
Poughkeepsie, N. Y., 173 A	41 42	52.7160	-0.0160	-0.0004	-0.0164	52.6996
Utica, N. Y., L. S. 92	43 06	131.1525	-0.0230	-0.0027	-0.0257	131.1268
Oswego, N. Y., A	43 27	76.7223	-0.0110	-0.0009	-0.0119	76.7104
Greenbush, N. Y., Grismill	42 40	4.2062	-0.0009	-0.0000	-0.0009	4.2053
El Reno, Okla., 1327 Reno Junction	35 33	405.0816	-0.3466	-0.0258	-0.3724	404.7092
Crawford, Nebr., G	42 42	1121.0991	-0.7978	-0.0454	-1.2432	1120.8637
Pocatello, Idaho, B	42 51	1360.3237	-0.2894	-0.2909	-0.5803	1359.7634
Ogden, Utah, B	41 13	1310.3649	-0.4560	-0.2979	-0.7539	1309.6390
Goffs, Cal., L	34 55	786.7842	-0.7165	-0.0694	-0.8139	785.9703
Belen, N. Mex., U. S. G. S. 4793	34 38	1461.2611	-1.3665	-0.3358	-1.7023	1459.5588
Georgetown, Ky., W	38 13	267.3015	-0.1657	-0.0112	-0.1769	267.1246
Louisville, Ky., U. S. E. B. M. 604 M	38 15	131.0896	-0.0809	-0.0027	-0.0836	131.0090
Mitchell, Ind., X	38 44	209.1505	-0.1199	-0.0069	-0.1268	209.0237
Terre Haute, Ind., U. S. G. S. 513	39 28	156.0739	-0.0792	-0.0038	-0.0830	155.9903

Comparison of orthometric elevations and dynamic numbers—Continued.

Place and bench mark.	Latitude. ϕ	Ortho- metric elevation. h	Dynamic correction for latitude. $-D_h$	Dynamic correction for elevation. $-D_h^2$	Total dynamic correction.	Dynamic number. H
<i>Junction points—Continued.</i>						
Vincennes, Ind., No. 1.....	38 40	130.8000	-0.0758	-0.0027	-0.0785	130.7215
Oakland, Ill., C.....	39 39	198.8568	-0.0975	-0.0062	-0.1037	198.7531
Shawneetown, Ill., P. B. M. Station.....	37 42	101.3552	-0.0708	-0.0018	-0.0726	101.2826
Duquoin, Ill., R.....	38 02	140.7773	-0.0896	-0.0031	-0.0927	140.6846
<i>Additional points.*</i>						
Gallitzin, Pa., P. R. R. No. 6.....	40 29	659.7338	-0.2738	-0.0685	-0.3423	659.3915
Sand Patch, Pa., B. & O. 186.....	39 49	603.1550	-0.3295	-0.0756	-0.4051	602.7505
Frederick Junction, Md., B. & O. 153 A.....	39 22	76.5848	-0.0395	-0.0009	-0.0404	76.5444
Cranberry Summit, W. Va., No. XXVI.....	39 25	756.1854	-0.3869	-0.0900	-0.4769	755.7085
Parkersburg, W. Va., No. XXXIX.....	39 15	185.0830	-0.0975	-0.0054	-0.1029	184.9801
Swearingin, Ala., Q.....	34 35	413.9487	-0.3888	-0.0270	-0.4158	413.5329
Swearingin, Ala., P.....	34 34	219.5381	-0.2065	-0.0076	-0.2141	219.3240
Northfield, N. Y., 1766 A.....	42 15	538.5312	-0.1364	-0.0456	-0.1820	538.3492
Hancock, N. Y., Bridge 18.....	41 58	278.1921	-0.0777	-0.0122	-0.0899	278.1022
Owyhee, Idaho, W.....	43 25	968.8904	-0.1320	-0.1286	-0.2606	968.6298
Hunts Junction, Wash., P.....	46 04	127.4300	+0.0125	-0.0026	+0.0099	127.4399
Altamont, Wyo., C.....	41 11	2200.6045	-0.7725	-0.7619	-1.5344	2199.0701
Etholen, Tex., A.....	31 12	1417.9282	-1.7347	-0.3164	-2.0511	1415.8771
San Onofre, Cal., V.....	33 22	3.0679	-0.0032	-0.0000	-0.0032	3.0647
Summit, Cal., L.....	34 20	1165.4345	-1.1200	-0.2137	-1.3337	1164.1008
Wendover, Wyo., N.....	42 19	1354.8987	-0.3350	-0.2888	-0.6238	1354.2749
Volente, Wyo., Z.....	41 15	2057.3917	-0.7097	-0.6659	-1.3756	2056.0161
Needles, Cal., O.....	34 50	147.0990	-0.1350	-0.0034	-0.1384	146.9606
Powell, Ariz., D.....	34 44	214.5162	-0.1987	-0.0072	-0.2059	214.3103
Riordan, Ariz., U. S. G. S. 7273.....	35 13	2216.5452	-1.9610	-0.7730	-2.7340	2213.8112

* See page 82.

CORRECTIONS APPLIED IN THE 1912 GENERAL ADJUSTMENT.

The three tables which follow have been prepared in order to exhibit fully the facts as to the corrections applied to the lines used in the 1912 net.

Table 1 gives the observed and corrected difference of elevation of the end bench marks of each link corresponding to the equations given on pages 77-79.

TABLE 1.—Differences of elevation.

Equation.	Observed difference.	Ortho- metric correction.	System- atic correction.	Corrected difference.	Equation.	Observed difference.	Ortho- metric correction.	System- atic correction.	Corrected difference.
<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>
1A.....	+ 14.8235	.....	.....	+ 14.8235	22J.....	- 47.4193	-0.0807	+0.0392	- 47.4608
4B.....	+ 5.0726	-0.0009	.....	+ 5.0717	.....	- 31.2385	-0.0086	+0.0359	- 31.2112
5B.....	+ 35.8766	.....	.....	+ 35.8766	24.....	+ 91.3468	+0.0044	+0.0270	+ 91.3154
5C.....	+ 35.4849	-0.0040	.....	+ 35.4809	25.....	+ 60.2292	-0.0092	.....	+ 60.2200
5D.....	+ 9.3550	-0.0004	.....	+ 9.3546	26.....	+ 43.6058	.....	+0.0546	+ 43.5512
6A.....	+ 5.5998	-0.0007	.....	+ 5.5991	27.....	+ 43.8270	-0.0009	.....	+ 43.8279
6B.....	+ 1.7178	-0.0007	.....	+ 1.7171	28.....	+ 16.7198	-0.0134	.....	+ 16.7064
6C.....	+ 3.3031	-0.0001	.....	+ 3.3032	29.....	+ 57.1819	+0.0021	+0.0141	+ 57.1981
6D.....	+ 7.6127	-0.0005	.....	+ 7.6132	30.....	+ 40.6991	-0.0221	+0.0253	+ 40.6949
7A.....	+ 1.0508	-0.0003	.....	+ 1.0505	31.....	+ 28.8706	-0.0169	.....	+ 28.8537
7B.....	+ 3.7047	-0.0013	.....	+ 3.7034	32A.....	+ 19.7118	-0.0080	+0.0850	+ 19.7888
7C.....	+ 5.2811	-0.0004	.....	+ 5.2807	32B.....	+ 43.3714	-0.0121	+0.1370	+ 43.4963
8A.....	+ 6.9112	-0.0012	.....	+ 6.9100	33A.....	+ 50.2177	-0.0450	.....	+ 50.1727
9.....	+ 18.4769	-0.0023	.....	+ 18.4746	33B.....	+ 4.0825	-0.0040	.....	+ 4.0785
10.....	+ 0.6914	.....	.....	+ 0.6914	34.....	+ 34.4398	+0.0002	+0.0253	+ 34.4653
11A.....	+ 2.1750	.....	.....	+ 2.1750	35C.....	+ 33.4115	-0.0166	.....	+ 33.3949
12A.....	+ 15.5581	-0.0030	+0.1381	+ 15.6932	35D.....	+ 50.8004	-0.0454	.....	+ 50.7550
13A.....	+ 15.6887	-0.0036	.....	+ 15.6851	35F.....	+ 12.8461	-0.0015	+0.0381	+ 12.8805
14A.....	+ 77.9193	-0.0001	+0.0584	+ 77.9776	35G.....	+ 42.9382	+0.0063	-0.0844	+ 42.9601
15.....	+ 104.9308	-0.0098	+0.2701	+ 105.1911	35H.....	+ 78.2550	-0.0011	+0.0304	+ 78.2843
16.....	+ 32.3287	-0.0196	+0.3520	+ 32.6611	35I.....	+ 17.0756	-0.0008	-0.0060	+ 17.0688
16A.....	+ 64.7374	-0.0240	.....	+ 64.7134	36C.....	+ 42.5945	-0.0001	.....	+ 42.5944
16B.....	+ 5.5652	+0.0026	.....	+ 5.5678	36D.....	+ 284.2168	+0.0113	.....	+ 284.2055
16C.....	+ 26.4098	+0.0016	.....	+ 26.4114	36F.....	+ 17.8512	-0.0168	.....	+ 17.8344
16D.....	+ 26.4163	+0.0015	.....	+ 26.4178	36G.....	+ 266.6896	-0.0525	.....	+ 266.6371
17.....	+ 38.0139	-0.0066	+0.1284	+ 38.1357	36H.....	+ 30.3215	-0.0179	.....	+ 30.3036
18A.....	+ 45.2804	-0.0070	.....	+ 45.2834	36I.....	+ 41.5760	-0.0076	.....	+ 41.5684
18B.....	+ 11.2870	-0.0018	.....	+ 11.2852	36J.....	+ 55.1436	+0.0022	.....	+ 55.1414
18C.....	+ 24.5491	-0.0062	.....	+ 24.5553	36K.....	+ 100.7367	-0.0214	.....	+ 100.7581
19.....	+ 38.2777	-0.0072	.....	+ 38.2705	36L.....	+ 25.8459	+0.0071	.....	+ 25.7788
20.....	+ 229.7044	-0.0997	+0.4690	+ 230.0737	37C.....	+ 114.4023	-0.0016	+0.0406	+ 114.4413
21.....	+ 48.3294	-0.0030	+0.0180	+ 48.3144	37E.....	+ 17.4672	+0.0050	.....	+ 17.4722
22A.....	+ 2.9496	-0.0017	+0.0158	+ 2.9655	38B.....	+ 5.1567	+0.0203	.....	+ 5.1364
22B.....	+ 76.4352	-0.0099	+0.0370	+ 76.4081	39A.....	+ 3.1775	-0.0277	.....	+ 3.1498
22E.....	+ 113.4466	+0.1403	.....	+ 113.3063	39C.....	+ 2.5875	-0.0351	.....	+ 2.6226
22F.....	+ 117.8405	+0.0040	-0.0698	+ 117.7747	39D.....	+ 0.2105	-0.0041	.....	+ 0.2064
22H.....	+ 1281.5046	-0.0510	-0.0821	+ 1281.3715	40A.....	+ 2.4044	-0.0102	.....	+ 2.3942
22I.....	+ 47.1272	-0.0721	+0.0392	+ 47.1601	40B.....	+ 2.6585	+0.0041	.....	+ 2.6544

TABLE 1.—Differences of elevation—Continued.

Equation.	Observed difference.	Ortho-metric correction.	System-atic correction.	Corrected difference.	Equation.	Observed difference.	Ortho-metric correction.	System-atic correction.	Corrected difference.
	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>		<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>	<i>Meters.</i>
40C.....	+ 5.8360	-0.0318		+ 5.8042	64A.....	- 54.4608	-0.1179		- 54.5787
40D.....	+ 6.1686	-0.0315		+ 6.2001	64B.....	+ 220.4525	-0.0756		+ 220.3769
41A.....	+ 4.0743	+0.0115		+ 4.0858	65.....	+ 124.9945	-0.0012		+ 124.9933
42A.....	+ 103.0855	+0.0072		+ 103.0937	66.....	+ 184.7546	-0.0420		+ 184.7126
43A.....	+ 244.1209	+0.0194		+ 244.1403	67.....	- 304.9094	-0.0082	+0.0595	- 304.8581
43B.....	- 75.9076	-0.0076		- 75.9152	68.....	- 304.6561	-0.0093		- 304.6654
43C.....	- 271.4866	-0.0203		- 271.5069	69.....	+ 191.1505	-0.0020	+0.0140	+ 191.1625
43D.....	- 86.5039	+0.0072		- 86.4967	70.....	+ 191.3401	-0.0015		+ 191.3386
43E.....	+ 39.9664	-0.0057		+ 39.9607	71.....	+ 106.1251	+0.0140		+ 106.1391
43F.....	- 170.4278	-0.0226		- 170.4504	72.....	- 65.0215	+0.0080		- 65.0135
43G.....	- 297.3734	-0.0143		- 297.3877	73.....	- 29.3801	+0.0126		- 29.3675
44A.....	+ 184.2006	+0.0188		+ 184.2194	74.....	+ 74.8711	+0.0068		+ 74.8779
44B.....	- 62.8310	+0.0158		- 62.8152	75.....	+ 11.6321	-0.0123		+ 11.6198
44C.....	- 7.9602	+0.0032		- 7.9570	76.....	+ 8.2110	-0.0103		+ 8.2007
44D.....	+ 54.9415	-0.0132		+ 54.9283	77.....	+ 26.1723	-0.0085		+ 26.1638
44E.....	+ 68.1732	-0.0122		+ 68.1610	78.....	- 3.4895	+0.0055		- 3.4840
44F.....	- 74.2653	+0.0173		- 74.2480	79.....	- 5.1780	+0.0005	+0.0311	- 5.1464
45A.....	- 118.0141	-0.0013		- 118.0154	80.....	+ 27.9232	-0.0046	+0.0657	+ 27.9843
45B.....	+ 152.9102	-0.0347		+ 152.8755	81.....	- 31.3551	+0.0095		- 31.3456
46B.....	- 77.1118	-0.0219		- 77.1337	82.....	- 18.6275	+0.0119		- 18.6156
47B.....	- 61.8102	-0.0002	+0.0198	- 61.7906	83.....	- 49.7325	+0.0103		- 49.7222
47C.....	+ 40.0451	+0.0008	+0.0046	+ 40.0505	84.....	- 23.8150	+0.0097		- 23.8053
47D.....	- 61.9468	+0.0001		- 61.9467	85.....	- 36.5133	+0.0194		- 36.4939
47F.....	- 43.4779	+0.0033		- 43.4746	86.....	- 44.7379	+0.0103		- 44.7276
47G.....	- 57.2077	+0.0051		- 57.2026	87.....	+ 62.1709	-0.0039		+ 62.1670
47H.....	- 5.7282	-0.0009		- 5.7291	88.....	+ 112.2295	+0.0374		+ 112.2669
47I.....	- 49.2281	+0.0003		- 49.2278	89.....	- 124.9438	+0.0058		- 124.9380
47J.....	+ 21.8572			+ 21.8572	90.....	- 62.6246	-0.0002		- 62.6248
48.....	- 59.5851	-0.0098	+0.1035	- 59.4914	91.....	+ 8.5321	-0.0197		+ 8.5124
49B.....	+ 140.4503	-0.0057	+0.0876	+ 140.5322	92.....	+ 41.5467	-0.0183		+ 41.5284
50.....	- 108.7551	-0.0029	+0.0908	- 108.6672	93A.....	- 60.2311	-0.0179		- 60.2490
51A.....	+ 54.4108	+0.0036		+ 54.4144	93B.....	+ 50.8714	-0.0145		+ 50.8569
51B.....	- 126.9618	+0.0025		- 126.9593	94.....	+ 239.4411	+0.0987		+ 239.5398
52A.....	+ 72.5714	+0.0045		+ 72.5759	95.....	+ 524.1827	-0.6961		+ 523.4866
53.....	- 4.2898	+0.0050		- 4.2848	96.....	+ 786.6880	-0.0624		+ 786.6356
54B.....	- 48.5028	-0.0002		- 48.5030	97.....	+ 674.2599	+0.0700		+ 674.3299
54C.....	+ 52.7282			+ 52.7282	98.....	+ 1056.0406	+0.0715		+ 1056.1121
55.....	+ 249.0783	-0.0193		+ 249.0590	99.....	+ 1277.1843	-0.2882		+ 1276.8961
56.....	- 262.6197	+0.1989		- 262.4208	100.....	+ 78.0957	-0.0082		+ 78.0875
57A.....	+ 725.9201	+0.2321		+ 726.1522	101.....	- 35.4331	+0.0092		- 35.4239
57B.....	- 657.4601	+0.0318		- 657.4283	102.....	+ 24.3962	-0.0104		+ 24.3858
58A.....	+ 536.7852	+0.0165		+ 536.8017	103.....	+ 24.8336	-0.0059		+ 24.8277
58B.....	- 50.1589	+0.2069		- 49.9520	104.....	+ 9.1425	-0.0064		+ 9.1361
58C.....	+ 1359.8234	+0.2760		+ 1360.0994	105.....	+ 42.8120	-0.0033		+ 42.8087
59.....	+ 128.9789	+0.0172		+ 128.9961	106.....	+ 25.3012	-0.0098		+ 25.2914
60.....	+ 105.1242	-0.0879		+ 105.0363	107.....	- 53.0216	-0.0114		- 53.0330
61.....	- 120.6951	-0.1058		- 120.8009	108.....	- 136.2213	-0.0010		- 136.2223
62.....	- 28.2743	-0.0453		- 28.3198	109.....	- 34.4056	+0.0038		- 34.4018
63.....	+ 33.3437	-0.0513		+ 33.7924					

Table 2 gives for each link the weight, the various corrections applied, and in the third column the probable error of the observed differences except in cases when a correction for systematic error was applied. In those cases the probable error of the corrected difference is given, and the systematic correction is shown in the fourth column.

TABLE 2.—Corrections to differences of elevation.

Equation	Weight <i>p</i>	Prob-able error	Sys-tematic correction	Addi-tional cor-rection adjust-ment of 1912	Total cor-rection adjust-ment of 1912	Equation	Weight <i>p</i>	Prob-able error	Sys-tematic correction	Addi-tional cor-rection adjust-ment of 1912	Total cor-rection adjust-ment of 1912
		<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>			<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
1A.....	0.39	52.2			- 50.6	16C.....	1.7	24.9			+ 2.6
4B.....	1.3	28.6			- 29.0	16D.....	2.1	22.5			+ 3.8
5B.....	1.1	31.1			+ 33.2	17.....	0.048	148.6	+ 128.4	- 186.4	- 58.0
5C.....	0.48	47.0			+ 65.6	18A.....	0.81	36.2			- 0.9
5D.....	2.2	22.0			+ 8.1	18B.....	0.81	36.2			+ 1.1
6A.....	2.5	20.6			+ 10.9	18C.....	0.82	36.0			+ 1.8
6B.....	1.9	23.6			- 2.9	19.....	0.52	45.2			- 40.1
6C.....	3.8	17.5			+ 2.1	20.....	0.0033	567.0	+ 469.0	- 1519.3	- 1050.3
6D.....	1.7	25.0			- 7.9	21.....	9.6	10.5	+ 18.0	+ 14.7	+ 3.3
7A.....	10.0	10.3			- 6.3	22A.....	3.0	18.8	+ 15.5	- 26.2	+ 10.4
7B.....	1.4	27.5			- 21.6	22B.....	0.28	61.6	+ 37.0	- 163.6	- 128.6
7C.....	2.7	19.8			- 12.0	22E.....	0.32	57.6			- 6.1
8A.....	1.0	32.6			- 15.5	22F.....	0.028	194.6	- 69.8	- 79.1	- 148.9
9.....	0.76	37.3			+ 16.5	22H.....	0.0047	475.1	- 82.1	+ 217.4	+ 135.3
10.....	4.4	15.5			+ 11.5	22I.....	0.083	113.0	+ 39.2	- 107.6	- 63.4
11A.....	1.9	23.6			- 6.5	22J.....	0.027	198.2	+ 39.2	+ 193.1	+ 232.3
12A.....	0.046	144.2	+ 138.1	- 211.6	- 73.5	23.....	0.77	37.1	+ 35.9	+ 5.8	+ 41.7
13A.....	0.50	46.1			- 65.4	24.....	0.042	158.9	+ 27.0	- 27.6	- 0.6
14A.....	0.032	182.0	+ 58.4	+ 203.3	+ 261.7	25.....	0.49	46.5			- 73.5
15.....	0.016	257.4	+ 270.1	- 511.8	+ 241.7	26.....	0.038	167.1	+ 54.6	- 259.1	- 204.5
16.....	0.016	257.4	+ 352.0	- 270.7	+ 81.3	27.....	0.61	41.7			+ 72.2
16A.....	0.39	52.2			+ 8.8	28.....	0.45	48.6			+ 34.5
16B.....	1.7	24.9			- 2.0	29.....	0.070	123.1	+ 14.1	- 80.6	- 66.5

TABLE 2.—*Corrections to differences of elevation—Continued.*

Equation	Weight <i>p</i>	Prob- able error	Sys- tematic cor- rection	Additional cor- rection, adjust- ment of 1912	Total cor- rection, adjust- ment of 1912	Equation	Weight <i>p</i>	Prob- able error	Sys- tematic cor- rection	Additional cor- rection, adjust- ment of 1912	Total cor- rection, adjust- ment of 1912
		mm.	mm.	mm.	mm.			mm.	mm.	mm.	mm.
30.....	0.022	219.2	+256.3	-251.1	+5.2	54B.....	1.3	28.6			-6.8
31.....	0.55	43.9			-37.7	54C.....	1.7	25.0			-12.2
32A.....	0.32	57.6	+85.0	-38.1	+46.9	55.....	0.001	113.7			-144.6
32B.....	0.11	98.2	+137.0	-88.1	+48.9	56.....	0.89	34.5			-0.6
33A.....	0.28	61.6			+37.6	58A.....	0.19	74.8			+55.1
33B.....	2.2	21.9			+0.2	58B.....	0.69	39.2			-6.8
34.....	0.15	84.1	+25.3	+74.3	+99.6	58C.....	0.12	94.0			+224.3
35C.....	1.1	29.6			-2.7	59.....	1.3	28.6			-34.1
35D.....	0.55	43.9			-25.9	60.....	0.31	58.5			-114.2
35G.....	0.055	138.9	-84.4	-151.5	-235.9	61.....	0.17	79.0			+51.0
35F.....	0.22	69.5	+38.1	+98.6	+136.7	62.....	0.21	71.1			+33.4
35H.....	0.14	87.1	+30.4	+34.9	+65.3	63.....	0.31	58.5			-7.0
35I.....	0.59	42.4	-6.0	+76.5	+70.5	64A.....	0.36	54.3			+19.1
36K.....	1.4	27.5			-17.1	64B.....	0.44	49.1			+39.9
36C.....	1.9	171.4			+7.1	65.....	0.37	53.6			-10.6
36D.....	0.027	198.2			+58.8	66.....	0.24	66.5			-47.8
36F.....	0.19	74.8			-62.8	67.....	0.12	94.0	+59.5	+18.3	+77.8
36G.....	0.035	174.1			-282.0	68.....	0.15	84.1			-114.9
36H.....	1.2	29.7			+2.0	69.....	0.69	39.2	+14.0	+41.2	+55.2
36I.....	0.77	37.1			+0.4	70.....	0.38	52.8			-120.9
36J.....	0.48	47.0			+5.9	71.....	0.14	87.1			-22.7
37C.....	0.056	137.6	+40.6	-57.6	+17.0	72.....	0.17	79.0			-182.9
37E.....	2.5	20.6			+2.9	73.....	0.24	66.5			+13.4
38B.....	1.4	27.5			+17.1	74.....	0.28	61.6			-40.2
39A.....	0.30	59.5			-27.5	75.....	0.90	34.6			+17.0
39C.....	0.18	76.8			+67.4	76.....	0.80	36.4			+61.8
39D.....	0.67	39.8			+19.0	77.....	0.37	53.6			+37.8
40A.....	0.41	50.8			+41.2	78.....	0.54	44.3			+36.2
40B.....	0.53	44.7			-29.5	79.....	0.064	129.7	+31.1	-31.7	-0.6
40C.....	0.58	42.8			+2.0	80.....	0.064	128.7	+65.7	-149.2	-83.5
40D.....	0.64	40.7			+30.0	81.....	1.9	23.6			-3.0
41A.....	0.35	55.1			-46.3	82.....	0.89	34.5			-0.5
42A.....	0.58	42.8			-30.9	83.....	1.3	28.6			+26.4
43A.....	0.18	76.8			+142.6	84.....	0.82	35.9			+42.2
43B.....	0.18	76.8			+26.7	85.....	0.074	119.6			-18.8
43C.....	0.17	79.0			+49.7	86.....	0.25	65.2			+30.9
43D.....	0.26	63.9			+14.2	87.....	5.8	13.5			+4.8
43E.....	0.16	81.4			+1.1	88.....	0.25	65.2			+41.1
43F.....	0.24	66.5			-27.5	89.....	0.21	71.1			+96.9
43G.....	0.14	87.1			-36.5	90.....	0.46	48.0			-44.5
44A.....	0.65	40.4			-63.8	91.....	0.60	42.0			-16.7
44B.....	0.27	62.7			-93.9	92.....	0.52	45.2			-1.2
44C.....	0.38	52.8			-42.3	93A.....	0.65	40.4			-14.7
44D.....	0.26	63.9			-13.5	93B.....	1.2	29.7			+59.7
44E.....	0.61	41.7			-34.4	94.....	103.0	103.0			-315.2
44F.....	0.16	81.4			-129.3	97A.....	0.37	53.6			-29.6
45A.....	0.057	136.4			+106.5	95.....	0.16	81.4			+94.1
45B.....	0.080	115.0			+47.5	96.....	0.25	65.2			+148.6
46B.....	0.12	94.0			+83.8	97.....	0.15	84.1			+147.0
47B.....	0.18	76.8	+19.8	-125.9	-106.1	98.....	0.16	81.4			+67.4
47C.....	0.64	40.7	+4.6	-28.3	-23.7	99.....	0.11	98.2			-299.8
47D.....	0.20	72.8			+50.0	57B.....	0.26	63.9			+163.6
47F.....	0.26	63.9			+12.1	100.....	1.5	84.1			-26.6
47G.....	0.20	72.8			+30.5	101.....	0.86	35.2			-12.8
47H.....	0.38	52.8			+20.9	102.....	0.69	39.2			+46.9
47I.....	0.19	74.7			+15.3	36L.....	0.50	46.0			+22.5
47J.....	1.5	26.6			+3.3	103.....	0.39	52.2			-106.3
48.....	0.12	94.0	+103.5	-138.4	-34.9	104.....	0.81	36.2			-0.0
49B.....	0.085	111.6	+87.6	+41.6	+129.2	105.....	2.4	66.5			-25.8
50.....	0.022	219.6	+90.8	-169.2	-78.4	106.....	1.0	32.6			-18.4
51A.....	1.1	31.1			+15.8	107.....	1.0	32.6			-43.6
51B.....	0.83	35.7			+13.0	108.....	1.2	29.7			+10.4
52A.....	0.15	84.1			-59.8	109.....	1.3	28.6			-7.3
53.....	0.072	38.4			+78.6						

Table 3 shows the same corrections as Table 2, expressed in millimeters per kilometer. The different links have been rearranged and placed in Table 3 in the order of magnitude of the total correction in the general adjustment of 1912, in millimeters per kilometer, and serial numbers on this basis have been assigned. The table serves to place the links in order of accuracy as shown by this standard, the most accurate line being placed first. In the column headed "Character of line" a single entry indicates that practically the whole link was of that character. If there are two or more entries, the link is a composite one, in which the character of the longer portion is mentioned first. The symbols 1899+ and 1899- refer to leveling by the Coast and Geodetic Survey in 1899 and later and before 1899, respectively; the abbreviation "G. S. 1905+" refers to leveling done by the United States Geological Survey in 1905 and later with instruments and methods similar to those used by the Coast and Geodetic Survey in 1899 and later; "Geol." refers to leveling by the United States Geological Survey previous to 1905; "Lake" refers to leveling by the United States Lake Survey, and "Water" to water leveling on the lakes; Van O. refers to Van Orden leveling.

TABLE 3.—Corrections to differences of elevation.

[Corrections in millimeters per kilometer.]

Equation.	Length.	System- atic correc- tion.	Addi- tional correc- tion, adjust- ment 1912.	Total correc- tion, adjust- ment 1912.	Character of line.	Equation.	Length.	System- atic correc- tion.	Addi- tional correc- tion, adjust- ment 1912.	Total correc- tion, adjust- ment 1912.	Character of line.
	km.	mm.	mm.	mm.			km.	mm.	mm.	mm.	
104.	185			0.000	Eng.	47F.	69			+ .18	B. & O.
36I.	196			-.002	1899+	45B.	271			+ .18	P. R. R., Geol.
33B.	68			+ .003	Eng.	73.	74			+ .18	B. & O.
24.	198	+ .14	- .14	-.003	1899-	6A.	61			+ .18	Eng.
82.	169			-.003	G. S. 1905+	43G.	202			- .18	Geol., Lake.
92.	287			-.004	Eng.	74.	207			- .19	1899+, B. & O.
79.	158	+ .20	- .20	-.004	1899-	44D.	93			- .20	Geol.
56.	169			-.004	1899+	43B.	131			+ .20	Geol.
18A.	186			-.005	Eng.	7B.	106			- .20	Eng.
18B.	186			+ .006	Eng.	94.	1504			- .21	1899+
43E.	154			+ .007	Geol.	7C.	56			- .21	Eng.
40C.	260			+ .008	Water.	5C.	315			+ .21	Eng.
18C.	183			-.010	Eng.	43C.	233			+ .21	Geol., Water.
22E.	466			-.013	1899+	13A.	301			- .22	Eng.
63.	478			-.015	Eng.	99.	1358			- .22	1899+, G. S. 1905+
36H.	128			+ .016	1899+	102.	216			+ .22	Eng.
30.	1000	+ .97	- .95	+ .020	1899-	83.	113			+ .23	G. S. 1905+
35C.	131			-.021	1899+, Lake.	22H.	585	- .14	+ .37	+ .23	1899-
16A.	388			+ .023	Eng., 1899+	60.	479			- .24	Eng.
16B.	86			-.023	Eng., 1899+	25.	306			- .24	Eng.
65.	410			-.026	1899+	5B.	140			+ .24	Eng.
16C.	86			+ .030	Eng.	21.	13	+1.38	-1.13	+ .25	1899-
58B.	217			-.031	1899+	4B.	116			- .25	Eng.
6B.	78			-.037	Eng.	53.	320			+ .25	Van. O.
81.	80			-.038	G. S. 1905+	96.	597			+ .25	1899+
64A.	413			+ .046	1899+	16.	314	+1.12	- .86	+ .26	1899-
62.	720			+ .046	Water, Eng.	100.	102			- .26	G. S. 1905+
6C.	40			+ .052	Eng.	103.	383			- .28	Eng.
16D.	72			-.053	1899+	45A.	382			+ .28	P. R. R.
39A.	500			-.055	Water.	43F.	99			- .28	Geol.
61.	893			+ .057	1899+, Eng.	27.	245			+ .29	Eng.
54B.	116			-.059	1899+	57B.	571			+ .29	1899+
109.	114			-.064	G. S. 1905+	50.	267	+ .34	- .63	- .29	1899-
93A.	230			-.064	G. S. 1906+	48.	119	+ .87	-1.16	- .29	1899-
91.	251			-.067	Eng.	59.	116			- .29	1899+
36D.	863			+ .068	Geol.	107.	152			- .29	G. S. 1905+
58A.	804			+ .069	1899+	17.	181	+ .71	-1.03	- .32	1899-
33A.	541			+ .070	Eng.	12A.	217	+ .64	- .98	- .34	1899-, Eng.
98.	964			+ .070	1899+	10.	34			+ .34	Eng.
51B.	182			+ .071	Lake.	47G.	89			+ .34	B. & O.
37E.	40			+ .072	Eng. Wye.	84.	122			+ .35	Eng. Wye.
57A.	407			-.073	1899+	44A.	166			- .38	Water., Geol.
101.	175			-.073	Eng.	36G.	671			- .39	Geol.
36L.	303			+ .074	1899+	32B.	123	+1.11	- .71	+ .40	1899-
85.	243			-.077	B. & O.	90.	108			- .41	1899+, B. & O.
66.	616			-.078	1899+	46B.	201			+ .42	Geol.
39C.	850			+ .079	Water.	105.	62			- .42	G. S. 1905+
11A.	79			-.082	Eng.	7A.	15			- .42	Eng.
108.	127			+ .082	G. S. 1905+	29.	151	- .09	+ .53	- .44	1899-
9.	197			+ .084	Eng.	44E.	78			- .44	Geol.
39D.	224			+ .085	Eng.	47H.	48			- .44	B. & O.
36C.	81			+ .088	1899+	86.	71			+ .44	B. & O.
6D.	89			-.089	Eng.	22A.	23	+ .69	-1.14	- .45	1899-
52A.	672			-.089	Lake, Eng.	47C.	50	+ .09	- .56	- .47	1899-
					Wye, Water.	93B.	124			+ .48	G. S. 1905+
35D.	272			-.095	1899+	22I.	141	+ .28	- .77	- .49	1899-
95.	961			+ .098	1899+	55.	293			- .49	Geol.
40B.	282			-.10	Water.	78.	124			+ .50	Eng. Wye.
37C.	170	+ .24	- .34	- .10	1899-	36F.	120			- .52	Geol.
28.	330			- .10	Eng.	80.	158	+ .42	- .95	- .53	1899-
41A.	430			- .11	Water, Eng. Wye.	47D.	90			+ .56	B. & O.
40A.	366			+ .11	Lake, Water.	35H.	107	+ .28	+ .32	+ .61	1899-
8A.	147			-.11	Eng.	22F.	239	+ .29	+ .33	- .62	1899-
36J.	50			+ .12	Geol.	32A.	71	+1.20	- .53	+ .66	1899-
5D.	67			+ .12	Eng.	67.	116	+ .51	+ .16	+ .67	1899-
42A.	260			- .12	Water, Lake.	44C.	62			- .68	Geol.
64B.	342			+ .12	1899+	15.	312	+ .87	-1.64	- .77	1899-
51A.	131			+ .12	Lake.	44F.	150			- .86	Geol.
106.	145			- .13	Eng.	23.	45	+ .80	+ .13	+ .93	1899-
1A.	383			- .13	Eng.	49B.	137	+ .64	+ .30	+ .94	1899-
40D.	233			- .13	Water, Lake.	22J.	244	+ .16	+ .79	+ .95	1899-
19.	287			- .14	Eng.	34.	104	+ .24	+ .71	+ .96	1899-
31.	275			- .14	Eng.	68.	117			- .98	B. & O.
77.	272			+ .14	Eng. Wye.	26.	205	+ .27	-1.28	-1.00	1899-
54C.	87			- .14	1899+	43A.	142			+1.00	Geol., Water.
97.	990			+ .15	1899+	98.	94			+1.00	P. R. R.
75.	111			+ .15	Eng. Wye.	44B.	86			-1.1	Geol.
88.	373			+ .15	Water, Geol. B. & O.	47B.	94	+ .2	-1.3	-1.1	1899-
					O.	69.	48	+ .3	+ .9	+1.2	1899-
43D.	94			- .15	Geol.	14A.	224	+ .3	+ .9	+1.2	1899-
38B.	105			+ .16	Lake.	35I.	52	- .1	+1.5	+1.4	1899-
36K.	109			+ .16	1899+	35G.	170	+ .5	-1.9	-1.4	1899-
78.	222			+ .16	Eng. Wye.	698.	7	+ .7	-2.2	-1.5	1899-
47I.	96			+ .16	B. & O.	35F.	85	+ .4	+1.2	+1.6	1899-
58C.	1296			+ .17	1899+	22B.	75	+ .5	-2.2	-1.7	1899-
87.	26			+ .18	1899+	72.	103			-1.8	B. & O.
71.	127			+ .18	B. & O.	70.	48			-2.5	B. & O.
47J.	18			+ .18	B. & O., 1899+						

RESOLUTION OF THE SEVENTEENTH INTERNATIONAL GEODETIC ASSOCIATION.

The following is a translation of the resolution adopted by the International Geodetic Association, at its Seventeenth General Conference, held at Hamburg, Germany, September, 1912:

Because of the important advances made in the art of leveling since the year 1867, when limits were first fixed for errors permissible in precise leveling, and because of the benefit accruing to the greater needs of Geodesy in creating a new class of more precise leveling, that is, one with narrower limits of error, and with its errors, both accidental and systematic, computed according to uniform rules:

Therefore, the Seventeenth General Conference of the International Geodetic Association, still preserving unchanged the limits of error of 1867 for precise leveling, decides to place hereafter in a new class of leveling, to be termed *leveling of high precision*, every line, set of lines or net which is run twice in opposite directions on different dates as far as possible, and whose errors, accidental and systematic, computed by the formulas hereinafter given, do not exceed:

± 1 mm. per km. for the probable accidental error,

or ± 1.5 mm. per km. for the mean accidental error;

± 0.2 mm. per km. for the probable systematic error,

or ± 0.3 mm. per km. for the mean systematic error.

If L denote the length of an unconnected line, or the length of the side of a polygonal circuit in the case of a net;
 ΣL , the aggregate length of the set of lines, or of the net under consideration;

Δ , the discrepancy between the results of the two runnings between consecutive bench marks;

r , the distance between these two bench marks;

s , the entire systematic discrepancy between the results of the two runnings, either for a whole line or for the side of a circuit;

f , the error of closure of a circuit of the net after the orthometric correction has been applied;

Σf^2 , the sum of the squares of the errors of closure of the circuits, including the closing error, Σf , of the outside circuit;

Then, the probable or mean errors are to be computed by the following formulas:

1. For the probable accidental error, η_r , in the case of a set of lines, whether or not they form circuits:

$$\text{I. } \eta_r^2 = \frac{1}{9} \left[\frac{\Sigma \Delta^2}{\Sigma L} - \frac{\Sigma r^2}{(\Sigma L)^2} \Sigma s^2 \right].$$

2. For the probable systematic error, σ_r or σ_K :

(a) In the case of a set of lines not forming a net:

$$\text{II. } \sigma_r^2 = \frac{1}{9 \Sigma L} \Sigma \frac{s^2}{L}.$$

(b) In the case of a net allowing at least 10 circuits:

$$\text{III. } \sigma_K^2 = \frac{1}{\Sigma L^3} \left[\frac{2}{9} \Sigma f^2 - \eta_r^2 \Sigma L \right].$$

3. For the mean accidental error, or for the mean systematic error, the same formulæ as above, after multiplying the second member by $\frac{9}{4}$.

COMPUTATIONS ACCORDING TO THE INTERNATIONAL GEODETIC ASSOCIATION RESOLUTION.

The accidental and systematic errors in the leveling done by the Coast and Geodetic Survey since 1899 have been computed in accordance with these resolutions. There were not enough circuits to justify the computation of errors from the circuit closures. Some details of the computation for the various lines are shown in the following table. In some cases extra decimals used in the computation have been cut off in stating the result. To obtain the s the process given by Lallemand in his "Nivellement de haute Précision," page 713, was used. The accumulated discrepancy was plotted as ordinate s against the distance in kilometers from an initial bench mark as abscissa. The line connecting these points gave a somewhat irregular line which, nevertheless, showed, as a rule, a tendency to a fairly well-defined slope. A straight line was drawn by eye to represent as nearly as possible the tendency of the irregular line, and was tested to see whether the area between the irregular line and the straight line, lying above

the latter, was equal to the area between the two lines and below the straight line. After a straight line was finally adopted the difference between the two ordinates corresponding to the two ends of the line of levels gave the value of s .

Data for accidental and systematic errors.

Line.		Length of line. <i>L</i> .	System- atic dis- crepan- cy. <i>s</i> .	Num- ber of sec- tions. <i>N</i> .	Σd^2 .	Σr^2 .	$\frac{s}{3L}$.	$\frac{s^2}{L}$.
From—	To—							
		km.	mm.					
San Diego, Cal., Tidestaff.....	Barstow, Cal., J ₃	375	- 22	280	1812	587	0.02	1.3
Barstow, Cal., J ₃	Las Vegas, Nev., 2033 B.....	392	- 19	240	2206	678	.02	0.9
Las Vegas, Nev., P.....	Zenda, Utah, I ₉	404	-148	329	1874	550	.12	54.2
Salt Lake City, Utah, W ₁	Zenda, Utah, I ₉	324	+ 75	215	1565	516	.08	17.4
Ogden, Utah, A.....	Salt Lake City, Utah, W ₁	63	- 4	44	273	102	.02	0.2
Ogden, Utah, B.....	Pocatello, Idaho, B ₃	217	- 33	149	1031	341	.05	5.0
Pocatello, Idaho, B ₃	Owyhee, Idaho, W ₄	358	- 51	252	1537	538	.05	7.3
Owyhee, Idaho, W ₄	Hunts Junction, Wash., P ₃	502	+100	352	2725	764	.07	19.9
Seattle, Wash., Tidal 4.....	Hunts Junction, Wash., P ₃	435	+ 22	337	2167	640	.02	1.1
Pocatello, Idaho, A ₂	Butte, Mont., D ₂	435	-100	306	2029	739	.08	23.0
Butte, Mont., D ₂	Huntley, Mont., U. S. R. S. 3.....	409	+ 44	248	2149	718	.04	4.7
Huntley, Mont., U. S. R. S. 3.....	Cadiz, Mont., W ₈	291	- 41	193	1467	468	.05	5.8
Crawford, Nebr., G ₄	Cadiz, Mont., W ₈	377	- 26	345	1506	436	.02	1.8
Goffs, Cal., M ₈	Albuquerque, N. Mex., Astro.....	982	+ 46	677	4827	1517	.02	2.2
Jericho, Tex., B ₁₀	Isleta, N. Mex., N ₂	670	+ 75	613	2533	780	.04	8.4
El Reno, Okla., 1327 Reno Junction.....	Jericho, Tex., B ₁₀	324	+ 2	237	1381	484	.00	0.0
Temple, Tex., L ₄	Holland, Tex., Y ₄	26	- 11	18	172	43	.15	4.6
Smithville, Tex., W ₈	Galveston, Tex., Tide Gauge, C. & G. S.....	273	- 47	198	1082	440	.06	8.1
Holland, Tex., W ₄	New Braunfels, Tex., S ₆	230	-121	158	1350	357	.17	63.7
Fort Worth, Tex., M ₂	El Paso, Tex., E ₁₀	990	-188	831	4587	1281	.06	35.7
Bowie, Tex., 1124 Gainv.....	Anthony, Kans., SE. Base.....	433	- 87	271	1803	678	.07	17.5
Bowie, Tex., 1124 Gainv.....	Bodcau, La., P. B. M. 44.....	533	- 79	346	2281	849	.05	11.7
Norfolk, Nebr., T. B. M. 2.....	Sioux City, Iowa, P. B. M. 397.....	129	+ 27	82	541	209	.07	5.6
Fort Worth, Tex., U.....	Lampasas, Tex., NE. Base.....	287	- 46	189	1317	459	.05	7.4
Solomon, Kans., W ₂	Anthony, Kans., F ₁	241	-109	159	1017	353	.15	49.3
Watertown, S. Dak., U.....	Sioux City, Iowa, P. B. M. 397.....	362	- 47	239	1248	672	.04	6.1
St. Cloud, Minn., P. B. M. St. Cloud.....	Watertown, S. Dak., U.....	407	+ 5	304	2178	629	.00	0.1
Evansville, Minn., T ₁	Stephen, Minn., West Base.....	314	+ 40	222	1084	497	.04	5.1
Abilene, Kans., B ₁	Norfolk, Nebr., P ₁	470	+283	460	2667	496	.20	170.4
Norfolk, Nebr., P ₁	Page, Nebr., S. W. Base.....	107	+ 59	69	568	177	.19	32.5
Page, Nebr., T. B. M. 2.....	Chadron, Nebr., C ₄	426	+ 72	275	2018	678	.06	12.2
Chadron, Nebr., C ₄	Orin Junction, Wyo., R ₁	203	- 10	139	703	313	.02	0.5
Cheyenne, Wyo., T. B. M. 1.....	Orin Junction, Wyo., T ₁	245	- 32	160	1179	387	.04	4.2
Denver, Colo., A ₂	Rock Creek, Wyo., V.....	342	- 48	349	2100	345	.05	7.0
Rock Creek, Wyo., U.....	Red Desert, Wyo., B ₃	212	+ 26	155	841	319	.04	3.2
Red Desert, Wyo., B ₃	Azusa, Wyo., T. B. M. 105.....	177	+ 69	123	1072	267	.13	26.9
Ogden, Utah, B.....	Azusa, Wyo., T. B. M. 105.....	243	+ 10	173	1371	374	.01	0.4
Ludlow, Ky.*.....	Somerset, Ky., B ₃	255	+ 43	168	948	455	.06	7.2
Somerset, Ky., B ₃	Knoxville, Tenn., 867 M. C.....	250	+ 86	179	1154	386	.15	29.6
Harriman, Tenn., A ₃	Woodville, Ala., K ₂	247	+ 4	177	826	373	.01	0.1
Woodville, Ala., J ₂	Birmingham, Ala., P. B. M. 3.....	219	+184	149	1136	348	.28	154.6
Decatur, Ala., P. B. M. 50.....	Tuscumbia, Ala., P. B. M. 8.....	72	+ 9	60	261	108	.04	1.1
Dobbs Ferry, N. Y., V.....	Troy, N. Y., City 2.....	215	+ 76	207	850	290	.12	26.9
Fort Worth, Tex., U.....	Granbury, Tex., Comanche Ref. Mark.....	75	- 28	53	334	115	.13	10.4
Chicago Junction, Ohio, B. & O. 507.....	Deshler, Ohio, H ₁	109	- 22	80	621	167	.07	4.4
Greenwich, Ohio, B. & O. 495.....	Sullivan, Ohio, B. & O. 481.....	28	+ 5	31	108	40	.06	0.9
Ellwood City, Pa., B. & O. 349.....	Monaca, Pa., 25 A.....	26	+ 5	20	136	37	.06	1.0
Alliance, Ohio, Br. 66.....	Struthers, Ohio, B. & O. 376.....	69	+ 16	60	299	100	.08	3.7
Gibraltar, Mich. (1877).....	Leipsic, Ohio, T. B. M. 92.....	137	- 14	98	649	203	.03	1.4
Lima, Ohio, U ₁	Dayton, Ohio, Dayton City B. M.....	118	- 11	72	477	212	.03	1.0
Total.....		15028		11104	70020	25542		867.7

* Line is named Cincinnati to Somerset in Appendix 3. Report for 1913.

From the figures in the above table and the formulas previously given, there is found:

$$\eta_r^2 = \frac{1}{9} \left[\frac{70020}{15028} - \frac{22542}{(15028)^2} \times 867.7 \right]$$

$$= \frac{1}{9} [4.659 - 0.087]$$

$$\eta_r = \pm 0.713 \text{ mm.}$$

$$\sigma_r^2 = \frac{867.7}{9 \times 15028} = 0.006416.$$

$$\sigma_r = \pm 0.080 \text{ mm.}$$

In the computation of η_r^2 the number 0.087 represents the average effect of the systematic discrepancy in increasing the apparent size of the accidental discrepancy for a kilometer. This effect is here very small. If it were omitted in the computation, there would result $\eta_r = \pm 0.720$. A little consideration will show that the process employed on page 29 for calculating the probable accidental error for a kilometer is equivalent to the one given in the formula above, with the omission of the effect of the systematic discrepancy, which appears practically negligible for the lines here considered. (In the formulas of the Geodetic Conference $2/3$ is used as an approximation to 0.6745, the constant from the theory of errors.)

In the next to the last column of the table is given $\frac{s}{3L}$, which is the probable systematic error of the individual line, according to Lallemand's formulas. It will be seen that for only one line (Woodville-Birmingham) does the probable systematic error of an individual line go beyond the limit 0.2 mm. fixed in the resolution for leveling of high precision, while the lines as a class show a probable systematic error of less than half of the limiting value.*

This small systematic error, however, can not apparently include all sources of error.† The probable accidental error for a kilometer, obtained from the general adjustment (2.66 millimeters per kilometer,‡ see p. 81) is so much larger than the 0.7 millimeter found above that some effects of systematic error are indicated. See pages 18 to 21 for a discussion of systematic errors.

STANDARD ELEVATIONS.

The following list gives the adopted (or standard) elevations of each bench mark in the precise level net. The elevations of all bench marks not changed by the 1912 special adjustment have been carried forward from Appendix 3, Report for 1903, and Precise Leveling in the United States, 1903-7, so that reference to those publications is unnecessary, as far as elevations are concerned. The elevations are given in meters and feet above *mean sea level*. Mean sea level is assumed to be everywhere at the same level on the open coasts of the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean. Variations from this condition, if any, are so small that they come within the limits of the accuracy of the leveling.

It is intended to hold these elevations as standard elevations for an indefinite period. In the future, when new leveling is added, the lines will be fitted to the level net without in any way disturbing the present standard elevations, except in rare cases where earthquakes or other agencies have changed the elevations or where a mistake has been discovered in the standard elevations. An occasional mark will have its elevation changed by the settling of a building or other structure or from the effect of drainage of the land on which it is located, but this will be only a local matter.

If elevations of any of these bench marks are desired on any other basis than the standard basis, the correction necessary to transform them may be computed in a manner similar to the examples on pages 57-58.

* Since the formula for the probable systematic error of an individual line is not given in the resolution of the Geodetic Conference, but is taken for comparison from Lallemand's book cited above, it is probably the intent of the resolution that work of apparently similar quality should be judged by its average value, rather than by the values for individual lines.

† The expression "systematic error" is used in the resolution in the rather special sense of an error whose effect is directly proportional to the length of the line. There may well be other errors, not of the accidental class, whose effects follow a quite different law.

‡ Class I, for which this value applies, is not coextensive with the Coast and Geodetic Survey levels discussed here, but is assumed to include work of the same order of accuracy.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Sandy Hook, N. J.	T. H.	3.488	11.444	Morrison, Mo.	No. XIX.	160.785	527.509
Do.	A.	3.475	11.401	Chamolis, Mo.	O.	163.484	536.364
Do.	B.	2.863	9.393	St. Aubert, Mo.	No. XX.	164.254	538.890
Do.	C.	5.953	19.531	Near St. Aubert, Mo.	No. XXI.	164.087	538.342
Near Highlands, N. J.	No. II.	2.321	7.615	Isbell, Mo.	No. XXII.	164.588	539.986
Near Branchport, N. J.	No. V.	1.060	3.475	Bonnets Mill, Mo.	P.	168.348	552.322
Red Bank, N. J.	E.	11.728	38.478	Osage City, Mo.	No. XXIII.	167.079	548.159
Sandy Hook, N. J.	T of 1886.	3.280	10.761	Do.	No. XXIV.	166.684	546.863
Do.	U of 1886.	1.877	6.158	Near Osage City, Mo.	No. XXV.	169.867	557.305
Port Monmouth, N. J.*	S.	3.556	11.667	Jefferson City, Mo.	Old B. M. 90 (85).	169.894	557.394
Do.*	Port Monmouth tidal.	3.576	11.732	Do.	No. XXVII.	184.762	606.173
Keyport, N. J.*	R.	6.983	22.910	Do.	No. XXVIII.	191.572	628.516
Conasconk Point, N. J.*	Conasconk Point tidal.	3.960	12.992	Biloxi, Miss.	I ₁ or P. B. M. 18.	6.718	22.041
Matawan, N. J.*	No. VI.	† 16.860	55.315	Near Biloxi, Miss.	H ₁ or P. B. M. 19.	1.785	5.856
South Amboy, N. J.*	Tidal, South Amboy.	2.188	7.178	Do.	G ₁ or P. B. M. 20.	2.115	6.939
Near South Amboy, N. J.*	No. VIII.	4.437	14.557	Do.	F ₁ or P. B. M. 21.	0.327	1.073
Near Perth Amboy, N. J.*	F.	2.364	7.756	Near Ocean Springs, Miss.	E ₁ .	4.792	15.722
Perth Amboy, N. J.	State Geological Survey.	18.576	60.945	Ocean Springs, Miss.	D ₁ .	7.537	24.728
Near Giffords, N. Y.	N.	21.661	71.066	Scranton, Miss.	C ₁ .	5.168	16.955
Great Kills, N. Y.*	O.	1.720	5.643	Grand Bay, Ala.	B ₁ .	32.540	106.758
Do.*	Great Kills tidal.	2.001	6.565	St. Elmo, Ala.	A ₁ .	40.466	132.762
Fort Wadsworth, N. Y.*	M.	12.158	39.888	Mobile, Ala.	A.	3.745	12.287
Quarantine Dock, N. Y.*	Quarantine Dock.	2.550	8.366	Do.	Astronomic station.	4.666	15.308
Constables Hook, N. J.*	Constables Hook.	2.732	8.963	Citronelle, Ala.	B.	100.820	330.774
Do.*	P.	2.953	9.688	Near Citronelle, Ala.	E ₂ .	71.750	235.400
Bergen, N. J.*	Q.	4.070	13.353	Deer Park, Ala.	F ₂ .	46.932	153.976
Elm Park, N. Y.*	Elm Park tidal.	3.375	11.073	Escatawpa, Ala.	G ₂ .	53.608	175.879
Elizabeth, N. J.	Elizabeth tidal.	† 3.779	12.398	Near Escatawpa, Ala.	H ₂ .	65.654	215.400
Fort Hamilton, N. Y.*	L.	11.084	36.365	Near Bucatunna, Miss.	I ₂ .	80.748	264.921
Bath Beach, N. Y.*	Locust Grove tidal.	2.804	9.199	Bucatunna, Miss.	J ₂ .	46.125	151.328
Do.	K.	8.329	27.326	Winchester, Miss.	K ₂ .	51.227	168.067
Bay Ridge, N. Y.*	No. 25.	26.599	87.267	Waynesboro, Miss.	L ₂ .	58.803	192.923
Do.*	Bay Ridge tidal.	1.946	6.384	Near Waynesboro, Miss.	M ₂ .	54.136	177.611
Do.	J.	13.300	43.635	Shubuta, Miss.	N ₂ .	61.304	201.128
Brooklyn, N. Y.*	A.	20.048	65.774	De Soto, Miss.	O ₂ .	63.371	207.910
Do.*	G.	2.896	9.501	Quitman, Miss.	D ₂ .	70.059	229.752
Governors Island, N. Y.*	(Hydrographic) B. M. marks.	3.695	12.123	Do.	C ₂ .	70.858	232.473
Do.	H.	8.471	27.792	Enterprise, Miss.	B ₂ .	74.754	245.255
Do.	I.	† 2.438	7.999	Meridian, Miss.	C.	104.859	344.025
Do.	D.	† 2.603	8.540	Do.	D.	105.144	344.960
Brooklyn, N. Y.	C.	† 17.060	55.971	Seoba, Miss.	E.	58.989	193.533
Do.*	D.	4.114	13.497	Near Macon, Miss.	F.	53.621	175.922
Do.	E.	† 3.106	10.190	Macon, Miss.	No. 96.	54.985	180.397
Corlears Hook, N. Y.	F.	† 3.544	11.627	Artesia, Miss.	G.	71.451	234.419
Do.	Tidal, Corlears Hook.	2.339	7.674	West Point, Miss.	H.	72.572	238.097
Hunters Point, N. Y.*	Tidal, Hunters Point (No. 8).	1.817	5.961	Do.	I.	74.117	243.166
Do.	B.	† 2.402	7.881	Okolona, Miss.	L.	93.296	306.089
Ravenswood, N. Y.*	No. 7.	3.035	9.957	Do.	K.	94.854	311.200
Astoria, N. Y.*	No. 6.	3.630	11.909	Near Shannon, Miss.	M.	76.262	250.203
Near Astoria Dock, N. Y.*	No. 4.	1.799	5.902	Shannon, Miss.	N.	77.350	253.772
Pot Cove, N. Y.*	No. 1.	2.921	9.583	Verona, Miss.	O.	96.379	316.203
Do.*	No. 2.	4.187	13.737	Tupelo, Miss.	P.	85.186	279.481
Polhemus Dock, N. Y.	No. 4a.	† 2.061	6.762	Saltfido, Miss.	Q.	95.765	314.189
New York, N. Y.*	No. 5.	2.299	7.543	Guntown, Miss.	R.	121.747	399.432
Do.	Tidal, foot of Forty-second Street.	† 3.079	10.102	Baldwyn, Miss.	S.	114.525	375.737
Dobbs Ferry, N. Y.*	Tidal, Dobbs Ferry.	† 4.462	14.639	Booneville, Miss.	T.	162.758	533.982
Do.	V.	† 2.878	9.442	Rienzi, Miss.	U.	138.928	455.800
Long Island City, N. Y.*	No. 9.	3.951	12.963	Corinth, Miss.	V.	137.619	451.605
Flushing, N. Y.*	No. 10.	2.581	8.468	Do.	W.	137.676	451.692
College Point, N. Y.*	No. 11.	12.561	41.211	Ramer, Tenn.	X.	126.440	414.829
Do.	Tidal, Station No. 68.	2.922	9.587	Falcon, Tenn.	Y.	131.739	432.214
Do.*	No. 12.	10.480	34.383	Bethel Springs, Tenn.	Z.	142.731	468.277
Willets Point, N. Y.*	No. 105.	3.068	10.066	McNairy, Tenn.	No. XXVII.	139.641	457.811
Do.*	Tidal, U. S. Engineers.	4.308	14.134	Henderson, Tenn.	No. XXVI.	131.454	431.279
Sandy Hook, N. J.	No. I.	4.720	15.486	Pinson, Tenn.	No. XXV.	117.996	387.125
Navesink Highlands, N. J.	No. III.	61.714	202.473	Near Jackson, Tenn.	No. XXIV.	107.673	353.257
Do.	D.	63.274	207.591	Jackson, Tenn.	No. XXIII.	120.769	396.223
Seabright, N. J.	No. IV.	2.822	9.259	Do.	No. XXII.	119.793	393.021
Morgan, N. J.	No. VII.	1.705	5.594	Oakfield, Tenn.	No. XXI.	134.974	442.827
St. Louis, Mo.	K ₂ .	126.178	413.969	Medina, Tenn.	No. XX.	153.920	504.986
St. Paul, Mo.	No. X.	132.071	433.303	Milan, Tenn.	No. XIX.	131.235	430.560
Allenton, Mo.	No. XI.	146.363	480.192	Do.	No. XVIII.	129.437	424.661
Near South Point, Mo.	No. XII.	149.524	490.564	Bradford, Tenn.	No. XVII.	112.144	367.928
Washington, Mo.	I ₂ .	166.427	546.020	Greenfield, Tenn.	No. XV.	133.406	437.683
New Haven, Mo.	M ₂ .	155.388	509.802	Sharon, Tenn.	No. XIV.	127.360	417.847
Near New Haven, Mo.	No. XIII.	154.500	506.889	Martin, Tenn.	No. XIII.	127.309	417.680
Near Etah, Mo.	No. XIV.	155.322	509.585	McConnell, Tenn.	No. XII.	108.864	357.165
Berger, Mo.	No. XV.	156.068	512.033	Fulton, Ky.	No. XI.	109.864	360.445
Hermann, Mo.	N ₂ .	158.445	519.832	Alexander, Ky.	No. X.	112.931	370.508
Near Gasconade, Mo.	No. XVI.	159.474	523.208	Clinton, Ky.	No. IX.	119.275	391.321
Gasconade, Mo.	No. XVII.	159.712	523.983	Arlington, Ky.	No. VIII.	111.427	365.573
Do.	No. XVIII.	160.651	527.069	Bardwell, Ky.	No. VII.	119.732	392.821
				Near Bardwell, Ky.	No. VI.	97.417	319.609
				Fort Jefferson, Ky.	No. V.	98.668	323.713
				Wickliffe, Ky.	No. IV.	101.983	334.589
				East Cairo, Ky.	No. III.	99.053	324.975
				Cairo, Ill.	P. B. M. 3.	99.736	327.217
				Do.	P. B. M. 2.	97.326	319.310
				Do.	P. B. M. 1.	96.923	317.988

* Reported as probably destroyed by the Chief Engineer of the Board of Estimate and Apportionment of the city of New York.

† This elevation for VI at Matawan is derived from the 1886-7 line alone. The elevation given by the 1881 line is 16.7885.

‡ 1885.

§ These elevations of bench marks, established by the Coast and Geodetic Survey, were furnished by Mr. Frederick W. Koop, Assistant Engineer in Charge, Board of Estimate and Apportionment, New York City. Mr. Koop had supplemented the leveling in the vicinity of that city by many miles of precise leveling. The elevations under consideration result from an adjustment made by him.

** Reported in 1902 to have been destroyed.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Washington, D. C.	Navy Yard B. M. C. or 12.	2.877	9.439	Annapolis, Md.	Taylor	28.956	95.033
Do.	Capitol B. M.	27.641	90.988	Do.	No. XIII.	12.612	41.378
Do.	Monument B. M.	12.324	40.433	Do.	No. XII.	13.062	42.854
Do.	National Museum B. M.	9.059	29.721	Bowie, Md.	No. VII.	45.292	148.595
				Wilson, Md.	No. IV.	17.921	58.796
				Near Washington, D. C.	Hill.	84.071	275.823
				Washington, D. C.	No. II.	2.332	7.651
Richmond, Va.	O.	58.196	190.931	Do.	No. I or 5.	11.921	39.111
Laurel, Va.	N ₁	66.865	219.373	Do.	New C. S. Office.	23.746	77.907
Ashland, Va.	N	67.413	221.171	Do.	No. 8 or E.	1.630	5.348
Near Doswell, Va.	M.	44.673	146.565	Do.	No. 14 or Ordnance.	4.998	16.398
Rutherglen, Va.	K ₂	62.523	205.128	Do.	No. 16 or 24.	14.483	47.516
Penola, Va.	K ₁	29.713	97.483	Do.	No. 22.	9.385	31.490
Milford, Va.	K ₁	31.188	102.323	Do.	No. 25.	3.603	11.821
Near Guinea, Va.	I ₂	38.675	126.886	Do.	No. 30.	7.476	24.528
Near Summit, Va.	I ₁	60.822	199.547	Do.	No. 36.	6.170	20.243
Fredericksburg, Va.	I.	21.051	69.065	Do.	No. 41.	5.447	17.871
Do.	H.	13.129	43.074	Do.	No. 47 or Brewery.	4.148	13.609
Near Potomac Run, Va.	G ₈	25.906	84.993	Do.	No. 79.	9.842	32.290
Brooke, Va.	G ₇	17.959	58.920	Do.	No. 80.	9.991	32.779
Near Widewater, Va.	G ₆	2.247	7.372	Do.	No. 82.	9.057	29.715
Quantico, Va.	G ₅	10.736	35.223	Do.	No. 84 or Smithsonian.	9.596	31.483
Near Woodbridge, Va.	G ₄	20.954	68.747	Do.	No. 88.	8.972	29.436
Pohick Creek, Va.	G ₃	19.455	63.829	Do.	No. 92.	11.250	36.900
Near Accotink, Va.	G ₂	25.032	82.126	Do.	No. 93.	12.364	40.564
Cameron Run, Va.	G ₁	15.686	51.463	Do.	No. 95.	12.062	39.573
Alexandria, Va.	G.	14.247	46.742	Do.	No. 96.	12.004	39.383
				Do.	No. 97.	12.040	39.501
				Do.	No. 98.	12.050	39.534
				Do.	No. 101.	6.751	22.149
				Do.	No. 102.	10.104	33.150
				Do.	No. 103.	1.386	4.547
Old Point Comfort, Va.	Old Tidal B. M.	2.935	9.629	Birmingham, Ala.	P. B. M. 1.	184.008	610.360
Do.	U.	2.688	8.819	Do.	T. B. M. 1.	184.800	606.298
Fort Monroe, Va.	Fort B. M.	3.368	11.050	Do.	P. B. M. 2.	181.520	595.537
Newport News, Va.	S.	6.814	22.356	Do.	P. B. M. 3.	180.419	591.925
Morrison, Va.	R ₃	9.873	32.392	Do.	T. B. M. 2.	176.123	577.830
Lee Hall, Va.	R ₂	19.483	63.920	Do.	T. B. M. 3.	174.056	571.049
Williamsburg, Va.	R.	27.092	88.884	Elyton, Ala.	T. B. M. 7.	166.002	544.625
Toano, Va.	Q ₄	30.828	101.142	Near West End, Ala.	P. B. M. 4.	160.352	526.088
Diascond, Va.	Q ₃	13.543	44.432	Near Powderly, Ala.	T. B. M. 8.	157.270	515.977
Near Lanexa, Va.	Q ₂	2.340	7.677	Powderly, Ala.	T. B. M. 9.	159.489	524.438
Providence Forge, Va.	Q.	9.798	32.146	Near Powderly, Ala.	T. B. M. 10.	159.009	521.682
Roxbury, Va.	P ₃	13.054	42.828	Do.	T. B. M. 11.	156.225	512.548
Near Richmond, Va.	P ₄	34.261	112.405	Turpin, Ala.	T. B. M. 13.	157.873	517.955
Richmond, Va.	P ₂	5.982	19.626	Bessemer, Ala.	T. B. M. 14.	159.012	521.692
Do.	Do.	6.726	22.067	Do.	T. B. M. 15.	157.046	515.242
Do.	New City Hall B. M.	50.043	164.183	P. B. M. 5.	156.402	513.129	
Do.	Do.	62.753	205.882	Jonesboro, Ala.	T. B. M. 18.	154.896	508.188
Do.	City B. M.	7.768	25.486	Near McCalla, Ala.	T. B. M. 24.	150.498	493.759
				Near Baylor, Ala.	T. B. M. 27.	151.937	498.490
St. Augustine, Fla.	B. M. Fairfield.	2.212	7.257	Kimbrel, Ala.	P. B. M. 6.	149.672	491.049
Do.	B. M. Hitchcock.	0.398	1.306	Near Standiford, Ala.	T. B. M. 32.	147.347	483.421
Do.	Tidal Bench Mark.	0.266	0.873	Near Woodstock, Ala.	T. B. M. 39.	151.515	497.095
Do.	A.	2.148	7.047	Near Bibbville, Ala.	T. B. M. 42.	151.062	495.909
Do.	B.	2.039	6.690	Near Vance, Ala.	P. B. M. 7.	147.533	484.031
Do.	C.	2.407	7.897	Do.	T. B. M. 47.	143.814	471.830
Do.	D.	2.404	7.887	Near Coaling Station, Ala.	P. B. M. 8.	113.259	371.584
Tecol Junction, Fla.	E.	10.846	35.584	Near Johnson, Ala.	T. B. M. 60.	98.993	324.780
Middleton, Fla.	F.	10.543	34.590	Near Olmstead, Ala.	T. B. M. 63.	90.820	297.965
Hastings, Fla.	G.	2.294	7.526	Near Cottondale, Ala.	P. B. M. 9.	74.819	245.469
Buena Vista, Fla.	H.	4.487	14.721	Do.	T. B. M. 69.	106.709	350.094
East Palatka, Fla.	I.	5.135	16.847	Do.	T. B. M. 70.	110.159	361.413
Palatka, Fla.	J.	3.873	12.707	Near Tuscaloosa, Ala.	P. B. M. 75.	65.233	214.019
Francis, Fla.	B. M. Francis.	21.152	69.396	Near Tuscaloosa, Ala.	P. B. M. 11.	67.871	222.673
Hollister, Fla.	K.	24.466	80.269	Near Tuscaloosa, Ala.	Old B. M. 3.	44.721	146.722
Interlachen, Fla.	L.	32.136	105.433	Tuscaloosa, Ala.	P. B. M. 12.	34.278	112.460
McMeekin, Fla.	M.	36.646	120.229	Near Tuscaloosa, Ala.	Old B. M. 4.	34.272	112.441
Hawthorn, Fla.	N.	44.242	145.151	Do.	Old B. M. 5.	28.042	92.001
Do.	O.	44.757	146.840	Do.	P. B. M. 13.	38.574	126.555
Grove Park, Fla.	P.	30.645	100.541	Tuscaloosa, Ala.	P. B. M. 10.	50.845	166.814
Rochelle, Fla.	Q.	25.349	83.166	Near Tuscaloosa, Ala.	T. B. M. 78.	51.696	169.606
Gainesville, Fla.	R.	53.947	176.991	Do.	T. B. M. 80.	41.999	137.792
Do.	S.	54.014	177.211	Englewood, Ala.	T. B. M. 88.	42.190	138.418
Do.	T.	54.476	178.727	Hull, Ala.	T. B. M. 94.	39.166	128.497
Arredonda, Fla.	U.	27.072	88.819	Do.	P. B. M. 14.	39.438	129.390
Palmer, Fla.	V.	23.271	76.348	Moundville, Ala.	T. B. M. 100.	49.893	163.691
Archer, Fla.	B. M. Archer.	25.929	85.069	Do.	P. B. M. 15.	49.904	163.727
Albion, Fla.	B. M. Albion.	26.999	88.579	Powers, Ala.	P. B. M. 16.	41.712	136.850
Bronson, Fla.	W.	21.972	72.086	Akron, Ala.	P. B. M. 17.	39.683	130.193
Otter Creek, Fla.	B. M. Otter Creek.	9.871	32.385	Warrior River, Ala.	P. B. M. 18.	36.204	118.779
Ellzey, Fla.	X.	7.767	25.482	Do.	T. B. M. 122.	38.602	126.647
Rosewood, Fla.	B. M. Rosewood.	4.441	14.570	Near Eutaw, Ala.	T. B. M. 123.	35.735	117.241
Cedar Keys, Fla.	Tidal Bench Mark.	0.930	3.051	Do.	T. B. M. 124.	36.058	118.300
Do.	B. M. Perkins.	3.571	11.716	Eutaw, Ala.	P. B. M. 19.	53.066	174.101
Do.	Y.	4.002	13.130	Do.	P. B. M. 20.	65.857	216.066
Do.	Z.	4.054	13.300	Near Hairston, Ala.	T. B. M. 132.	49.726	163.143
Do.	B. M. Transit.	3.886	12.749	Do.	T. B. M. 138.	40.328	132.309
Annapolis, Md.	a.	11.268	4.160	Near Bolige, Ala.	T. B. M. 139.	37.385	122.654
Do.	Wood's.	11.110	3.642	Do.	P. B. M. 21.	37.386	122.657
Do.	b.	1.151	3.776	Near Miller, Ala.	T. B. M. 150.	33.911	111.256
Do.	5 S. R.	2.868	9.409	Near Eps, Ala.	P. B. M. 22.	29.708	97.467
Do.	1 S. R.	5.271	17.293	Eps, Ala.	P. B. M. 23.	34.813	114.216
Do.	Obs.	7.014	23.012				
Do.	Hern.	8.899	29.196				

* Destroyed. Reported 1903.

† Settled. Reported by U. S. Geological Survey, 1903.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Epes, Ala.	T. B. M. 152.	42.772	140.328	Near Cairo, Ill.	P. B. M. 62.	98.527	323.251
Near Epes, Ala.	T. B. M. 153.	49.181	161.355	Do.	P. B. M. 63.	102.716	336.994
Near Parker, Ala.	T. B. M. 156.	72.917	239.229	Do.	P. B. M. 64.	101.461	332.877
Parker, Ala.	T. B. M. 157.	81.436	267.178	Do.	P. B. M. 65.	97.381	319.491
Near Livingston, Ala.	T. B. M. 160.	71.829	235.659	Do.	P. B. M. 66.	95.398	312.985
Do.	T. B. M. 162.	55.567	182.306				
Livingston, Ala.	P. B. M. 24.	48.932	160.538				
Near Livingston, Ala.	P. B. M. 25.	37.205	122.063				
Near York, Ala.	T. B. M. 172.	42.722	140.164	Near Columbia Bottom, Mo.	P. B. M. 2= $\frac{1}{1}$	129.976	426.430
Do.	T. B. M. 175.	48.944	160.577	Top of cap over same	P. B. M. 3.	131.215	430.495
York, Ala.	P. B. M. 26.	47.446	155.662	Columbia Bottom, Mo.	T. B. M. 2.	131.174	430.360
Near York, Ala.	T. B. M. 179.	48.642	159.586	Do.	P. B. M. 4= $\frac{2}{1}$	130.964	429.671
Do.	T. B. M. 182.	50.884	166.942	Near Fort Bellefontaine, Mo.	Top of cap over same	131.177	430.370
Cuba, Ala.	P. B. M. 27.	65.428	214.658	Do.	P. B. M. 5.	132.415	434.432
Near Cuba, Ala.	T. B. M. 188.	72.861	239.045	Near Mouth of Cold Water Creek, Mo.	P. B. M. 6.	131.356	430.957
Toombs, Miss.	P. B. M. 28.	88.615	290.731	Jamestown Landing, Mo.	P. B. M. 6.	128.469	421.485
Near Russell, Miss.	T. B. M. 207.	125.920	413.123	Near Jamestown Landing, Mo.	P. B. M. 7.	132.146	433.549
Meridian, Miss.	T. B. M. 217.	101.868	334.212	Do.	Top of cap over same	133.380	437.598
Do.	P. B. M. 29.	103.883	340.823	Do.	P. B. M. 8.	127.460	418.175
				Do.	P. B. M. 9= $\frac{3}{1}$	134.563	441.479
Coatopa, Ala.	P. B. M. 1.	39.471	126.217	Top of cap over same	P. B. M. 10.	135.802	445.544
McDowell, Ala.	P. B. M. 2.	29.046	95.295	Near Musics Ferry, Mo.	P. B. M. 11.	138.943	455.849
Near McDowell, Ala.	P. B. M. 3.	28.137	92.313	Do.	Top of cap over same	132.194	433.706
Do.	P. B. M. 4.	28.130	92.290	Do.	P. B. M. 12; old	133.434	437.775
Demopolis, Ala.	Old B. M.	36.632	120.183	Do.	P. B. M. 11, 1887.	133.818	439.035
Do.	P. B. M. 5.	38.406	126.004	Musics Ferry, Mo.	P. B. M. 13.	137.050	449.638
Do.	P. B. M. 6.	38.714	127.014	Do.	P. B. M. 14= $\frac{4}{1}$	134.346	440.767
				Top of cap over same	P. B. M. 15.	135.584	444.829
Near Grafton, Ill.	P. B. M. 1.	128.406	421.279	Near Musics Ferry, Mo.	Top of cap over same	136.973	449.386
Do.	P. B. M. 2.	130.262	427.368	Charbonnier Point, Mo.	P. B. M. 16= $\frac{5}{1}$	132.608	435.065
Grafton, Ill.	P. B. M. 3.	* 133.210	437.400	Top of cap over same	P. B. M. 17.	133.845	439.123
Do.	P. B. M. 3.	† 133.175	436.925	Near St. Charles, Mo.	Top of cap over same	133.377	437.588
Do.	P. B. M. 4.	† 135.952	446.036	Do.	P. B. M. 18.	134.613	441.643
Jersey Landing, Ill.	P. B. M. 5.	135.329	443.992	Do.	Top of cap over same	132.723	435.442
Near Jersey Landing, Ill.	P. B. M. 6.	128.932	423.004	St. Charles, Mo.	P. B. M. 19.	133.954	439.481
Near Jersey Creek, Ill.	P. B. M. 7.	137.616	451.495	Do.	P. B. M. 20; old	139.106	456.384
Alton, Ill.	P. B. M. 8.	130.844	429.277	Do.	B. M. 17.	135.371	444.130
Do.	P. B. M. 9.	148.359	486.741	Do.	T. B. M. 23.	137.132	449.907
Near Alton, Ill.	P. B. M. 10.	129.943	426.321	Do.	T. B. M. 24—gauge	136.406	447.525
Do.	P. B. M. 11.	126.128	413.805				
Near Wilsons Island No. 5, Ill.	P. B. M. 12.	139.558	457.867	Do.	P. B. M. 21= $\frac{6}{2}$	135.757	445.396
Near St. Louis, Mo.	P. B. M. 13.	131.537	431.551	Top of cap over same	T. B. M. 25. City	136.994	449.454
St. Louis, Mo.	P. B. M. 14.	130.017	426.564	Do.	B. M.	139.054	456.213
Do.	P. B. M. 15.	126.995	416.649	Near St. Charles, Mo.	T. B. M. 32.	138.834	455.491
Do.	P. B. M. 16.	153.250	502.788	Do.	P. B. M. 22= $\frac{6}{1}$	146.377	480.239
Carondelet, Mo.	P. B. M. 17.	132.586	434.993	Top of cap over same	P. B. M. 23.	147.615	484.300
Jefferson Barracks, Mo.	P. B. M. 18.	150.804	494.763	Do.	Top of cap over same	136.301	447.181
Cliff Cave, Mo.	P. B. M. 19.	120.100	394.028	Do.	Top of cap over same	137.543	451.256
Near Cliff Cave, Mo.	P. B. M. 20.	125.002	410.111	Near Creve Coeur Lake, Mo.	P. B. M. 24= $\frac{7}{2}$	137.107	449.825
Near Jefferson Station, Mo.	P. B. M. 21.	123.952	406.666	Top of cap over same	P. B. M. 25.	138.347	453.893
Kimmswick, Mo.	P. B. M. 22.	124.596	408.779	Do.	P. B. M. 26.	136.214	446.895
Sulphur Springs, Mo.	P. B. M. 23.	123.216	404.251	Do.	Top of cap over same	137.453	450.960
Illinois, Mo.	P. B. M. 24.	125.659	412.266	Near Mona, Mo.	T. B. M. 45.	138.164	453.293
Platin Rock Creek, Mo.	P. B. M. 25.	117.546	385.649	Mona, Mo.	P. B. M. 27= $\frac{8}{1}$	137.452	450.957
Near Rush Tower, Mo.	P. B. M. 26.	118.565	388.992	Top of cap over same	P. B. M. 28.	138.691	455.022
Rush Tower, Mo.	P. B. M. 27.	120.586	395.623	Do.	Top of cap over same	141.119	462.988
Near Cliff, Mo.	P. B. M. 28.	115.457	378.795	Do.	T. B. M. 51.	142.355	467.043
Do.	P. B. M. 29.	124.946	409.927	Gumbo, Mo.	P. B. M. 29= $\frac{9}{1}$	140.518	461.019
Near White Sand Depot Landing, Mo.	P. B. M. 30.	118.596	389.094	Top of cap over same	P. B. M. 30.	142.666	468.063
Near Ste. Genevieve, Mo.	P. B. M. 31.	122.814	402.932	Do.	P. B. M. 31= $\frac{10}{1}$	140.317	460.357
Ste. Genevieve, Mo.	P. B. M. 32.	119.064	390.629	Do.	Top of cap over same	141.554	464.415
Do.	P. B. M. 33.	122.225	401.000	Near Centaur, Mo.	P. B. M. 32.	144.554	464.415
Quarrytown, Mo.	P. B. M. 34.	117.164	384.396	Do.	T. B. M. 56.	140.855	460.122
Ste. Marys, Mo.	P. B. M. 35.	118.572	389.015	Near Port Royal, Mo.	P. B. M. 33.	140.279	460.232
Do.	P. B. M. 36.	120.689	395.960	Top of cap over same	P. B. M. 34.	141.514	464.284
Near Ste. Marys, Mo.	P. B. M. 37.	112.023	367.529	Do.	T. B. M. 61.	143.312	470.183
Chester, Ill.	P. B. M. 38.	116.002	380.583	Do.	P. B. M. 35= $\frac{11}{1}$	143.980	472.374
Near Chester, Ill.	P. B. M. 39.	116.179	381.164	Port Royal, Mo.	Top of cap over same	144.650	474.573
Do.	P. B. M. 40.	111.964	367.335	Do.	T. B. M. 62.	145.892	478.647
Bols Brulé, Mo.	P. B. M. 41.	110.488	362.493	Do.	T. B. M. 63.	144.203	473.106
Near Grand Eddy, Mo.	P. B. M. 42.	113.339	371.846	Near Port Royal, Mo.	P. B. M. 36.	146.046	479.153
Do.	P. B. M. 43.	112.685	369.701	Do.	Top of cap over same	147.284	483.214
Near Wittenberg, Mo.	P. B. M. 44.	112.465	368.979				
Wittenberg, Mo.	P. B. M. 45.	110.511	362.568				
Near Wittenberg, Mo.	P. B. M. 46.	110.386	362.158				
Near Tower Rock, Mo.	P. B. M. 47.	104.918	344.218				
Birmingham Point, Mo.	P. B. M. 48.	103.947	341.033				
In Cape Girardeau County, Mo.	P. B. M. 49.	104.116	341.587				
Do.	P. B. M. 50.	104.142	341.673				
Near Bainbridge Creek, Mo.	P. B. M. 51.	103.050	338.090				
Do.							
Near Cape Rock, Mo.	P. B. M. 52.	104.491	342.818				
Do.	P. B. M. 53.	102.681	336.879				
Cape Girardeau, Mo.	P. B. M. 54.	105.667	346.676				
Do.	P. B. M. 55.	108.690	356.594				
Do.	P. B. M. 56.	101.042	331.502				
Grays Point, Mo.	P. B. M. 57.	104.824	343.910				
Near Commerce, Mo.	P. B. M. 58.	104.596	343.162				
Commerce, Mo.	P. B. M. 59.	112.673	369.661				
Do.	P. B. M. 60.	104.422	342.591				
Do.	P. B. M. 61.	110.550	362.696				

* As originally located.

† In new position. See Precise Leveling in the United States, 1903-1907, page 177.

‡ This elevation is from levels run in 1902. The bench mark had apparently settled 0.019 meter since its elevation was determined in 1880.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Port Royal, Mo.	P. B. M. 37.	154.067	505.468	Near Etiah, Mo.	T. B. M. 122.	155.645	510.645
St. Albans, Mo.	P. B. M. 38— ¹² ₁	146.068	479.225	Do.	T. B. M. 123—Old R. R. B. M.	154.365	506.906
Near Becker, Mo.	Top of cap over same	147.304	483.280	Near Berger, Mo.	T. B. M. 125.	155.913	511.525
Do.	T. B. M. 69.	149.849	491.530	Do.	P. B. M. 64.	156.772	514.343
Do.	P. B. M. 39.	146.984	482.230	Do.	Top of cap over same	158.004	518.383
Do.	Top of cap over same	148.223	486.295	Do.	T. B. M. 126.	155.210	509.218
Do.	P. B. M. 40.	145.785	478.296	Do.	P. B. M. 65.	156.082	515.032
Do.	P. B. M. 41.	142.026	465.964	Do.	P. B. M. 66— ²⁰ ₁	154.849	508.034
Near Labaddie, Mo.	Top of cap over same	143.263	470.022	Berger, Mo.	Top of cap over same	154.689	512.092
Do.	P. B. M. 42.	149.505	490.501	Do.	T. B. M. 128.	155.806	511.174
Near Boles, Mo.	P. B. M. 43— ¹³ ₁	142.804	468.516	Near Berger, Mo.	P. B. M. 67.	154.724	507.624
Do.	Top of cap over same	144.040	472.571	Near Hermann, Mo.	Top of cap over same	153.954	511.692
Do.	T. B. M. 78.	148.994	488.824	Do.	T. B. M. 129.	153.859	511.675
Do.	P. B. M. 44.	148.041	485.698	Do.	T. B. M. 130.	157.017	515.147
Do.	P. B. M. 80.	147.547	484.077	Do.	P. B. M. 68.	155.814	511.200
Boles, Mo.	T. B. M. 81.	148.092	485.865	Do.	Top of cap over same	157.050	515.255
Near Boles, Mo.	P. B. M. 45.	144.509	474.110	Do.	T. B. M. 132.	156.075	512.056
Do.	Top of cap over same	145.740	478.149	Do.	P. B. M. 69.	158.165	518.913
Do.	T. B. M. 83.	148.814	488.234	Do.	T. B. M. 133.	156.905	514.779
Near South Point, Mo.	T. B. M. 84.	148.621	487.601	Do.	P. B. M. 70— ²¹ ₁	155.767	511.046
Do.	T. B. M. 85.	147.009	482.312	Hermann, Mo.	Top of cap over same	157.001	515.094
Do.	P. B. M. 46— ¹⁴ ₁	147.706	484.599	Do.	P. B. M. 71.	155.713	510.868
Do.	Top of cap over same	148.941	488.651	Do.	T. B. M. 135.	158.182	518.969
Do.	T. B. M. 86.	118.089	485.855	Do.	P. B. M. 72—Old B. M. 59.	157.696	517.374
Do.	P. B. M. 47.	150.227	492.870	Do.	P. B. M. 73.	159.476	523.214
Do.	T. B. M. 87.	148.308	486.574	Near Hermann, Mo.	Top of cap over same	160.716	527.282
Do.	T. B. M. 88.	147.222	483.011	Do.	T. B. M. 136.	157.654	517.236
Do.	P. B. M. 48.	147.596	484.238	Do.	T. B. M. 137.	159.160	522.177
South Point, Mo.	Top of cap over same	148.835	488.303	Do.	P. B. M. 74.	157.553	516.905
Do.	T. B. M. 89.	148.972	488.752	Near Gasconade, Mo.	T. B. M. 139.	160.198	525.583
Near Washington, Mo.	T. B. M. 90.	149.112	489.212	Do.	P. B. M. 75— ²² ₁	159.656	523.805
Washington, Mo.	P. B. M. 50.	150.490	493.733	Do.	Top of cap over same	160.894	527.866
Do.	T. B. M. 92.	149.685	491.092	Do.	T. B. M. 140.	157.549	516.892
Do.	T. B. M. 94—Old B. M. 75, 1879.	151.722	497.775	Do.	T. B. M. 141.	159.639	523.749
Do.	T. B. M. 95.	151.929	498.454	Do.	P. B. M. 76.	158.783	520.941
Do.	P. B. M. 51— ¹⁵ ₁	151.140	495.865	Do.	Top of cap over same	160.019	521.991
Do.	Top of cap over same	152.376	499.920	Do.	T. B. M. 142—Old R. R. B. M.	158.059	518.565
Do.	T. B. M. 96—Old B. M. 42a.	149.510	490.517	Do.	T. B. M. 143.	160.423	526.321
Near Washington, Mo.	T. B. M. 97.	149.995	492.109	Gasconade, Mo.	T. B. M. 144, Gasconade Survey, B. M. 1879.	159.669	523.847
Do.	P. B. M. 52.	152.829	501.406	Do.	P. B. M. 77.	159.666	523.838
Do.	T. B. M. 98.	151.502	497.053	Near Gasconade, Mo.	T. B. M. 145.	160.428	526.338
Do.	P. B. M. 53.	148.771	488.093	Do.	T. B. M. 146.	157.793	517.693
Do.	Top of cap over same	150.006	492.145	Do.	P. B. M. 78— ²³ ₁	160.644	527.046
Do.	T. B. M. 99—Old B. M. 43a.	150.055	492.305	Do.	Top of cap over same	161.882	531.108
Do.	T. B. M. 100.	152.020	498.752	Do.	P. B. M. 79.	159.635	523.736
Near Dundee, Mo.	P. B. M. 54— ¹⁶ ₁	151.335	496.505	Near Morrison, Mo.	T. B. M. 148.	159.524	523.372
Do.	Top of cap over same	152.572	500.567	Do.	T. B. M. 149—Old R. R. B. M.	160.094	525.242
Do.	T. B. M. 105.	151.519	497.109	Do.	P. B. M. 80.	160.792	527.532
Do.	P. B. M. 55.	152.010	498.719	Morrison, Mo.	Top of cap over same	162.030	531.593
Do.	Top of cap over same	153.243	502.765	Do.	P. B. M. 81.	162.190	532.118
Do.	T. B. M. 106.	152.949	501.800	Do.	T. B. M. 150.	161.087	528.500
Do.	P. B. M. 56.	154.104	505.590	Near Morrison, Mo.	T. B. M. 151.	160.181	525.527
Dundee, Mo.	P. B. M. 57— ¹⁷ ₁	147.302	483.273	Do.	P. B. M. 82.	162.667	533.683
Do.	Top of cap over same	148.542	487.342	Do.	P. B. M. 83— ²⁴ ₁	162.406	532.827
Do.	T. B. M. 108—Old B. M. 46 (b).	151.039	495.534	Do.	Top of cap over same	163.643	536.885
Do.	T. B. M. 107—Old R. R. B. M.	152.893	501.616	Do.	T. B. M. 153.	162.513	533.178
Do.	T. B. M. 109—Old B. M. 46a.	152.912	501.679	Near Chamols, Mo.	T. B. M. 154.	161.292	529.172
Kent, Mo.	T. B. M. 110.	152.816	501.364	Do.	T. B. M. 155.	161.610	530.215
Near Kent, Mo.	T. B. M. 111—Old B. M. 47.	152.748	501.141	Do.	P. B. M. 84.	160.906	527.906
Do.	T. B. M. 112.	153.582	503.877	Do.	Top of cap over same	162.144	531.967
Do.	P. B. M. 58.	154.046	505.399	Do.	T. B. M. 157.	164.494	539.677
Near New Haven, Mo.	Top of cap over same	155.284	509.461	Chamols, Mo.	T. B. M. 158.	162.258	532.341
Do.	T. B. M. 113.	153.631	504.038	Do.	P. B. M. 85.	163.970	537.958
Do.	P. B. M. 59.	155.248	509.343	Do.	P. B. M. 86— ²⁵ ₁	161.658	530.373
Do.	T. B. M. 114.	154.630	507.315	Do.	Top of cap over same	162.901	534.451
Near New Haven, Mo.	P. B. M. 60— ¹⁸ ₁	153.718	504.323	Near Chamols, Mo.	T. B. M. 160—Old R. R. B. M.	163.125	535.186
Do.	Top of cap over same	154.959	508.395	Near Deer Creek, Mo.	P. B. M. 87.	163.613	536.787
Do.	T. B. M. 115.	155.326	509.299	Do.	Top of cap over same	164.857	540.868
Do.	T. B. M. 116.	154.182	505.845	Do.	T. B. M. 161.	165.076	541.587
Near New Haven, Mo.	P. B. M. 61.	156.408	513.149	Do.	P. B. M. 88.	162.326	529.565
Near Etiah, Mo.	T. B. M. 118.	154.903	508.211	Near St. Aubert, Mo.	P. B. M. 89—Old B. M. 74.	161.502	529.861
Do.	P. B. M. 62.	154.310	506.265	Do.	T. B. M. 163.	162.530	533.234
Do.	Top of cap over same	155.550	510.334	Do.	T. B. M. 164.	164.690	540.320
Do.	T. B. M. 119.	155.099	508.854	Do.	P. B. M. 90— ²⁶ ₁	164.722	540.425
Do.	T. B. M. 120.	155.056	508.713	St. Aubert, Mo.	Top of cap over same	165.964	544.500
Do.	P. B. M. 63— ¹⁹ ₁	155.907	511.505	Do.	P. B. M. 91.	164.069	538.283
Etiah, Mo.	Top of cap over same	157.150	515.583	Shipley Landing, Mo.	Top of cap over same	165.307	542.345
				Do.	T. B. M. 167.	165.594	541.286

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Loose Creek, Mo.	T. B. M. 168.	166.679	546.846	High Bridge, Ky.	J ₁	232.834	763.890
Isbell, Mo.	P. B. M. 92= ²⁷ / ₁	161.884	531.114	Near High Bridge, Ky.	K ₁	234.686	769.966
Do.	Top of cap over same	163.118	535.163	Between High Bridge and Burgin, Ky.	L ₁	264.987	869.378
Do.	P. B. M. 93.	167.227	548.644	Burgin, Ky.	M ₁	274.677	901.169
Do.	T. B. M. 169.	166.428	546.023	Do.	N ₁	273.508	897.334
Near Isbell, Mo.	T. B. M. 170.	167.908	550.878	Faulconer, Ky.	O ₁	271.216	889.814
Near Bonnots Mill, Mo.	T. B. M. 171= Old R. R. B. M.	165.184	541.941	Near Danville, Ky.	P ₁	280.872	921.494
Do.	P. B. M. 94.	163.187	535.389	Danville, Ky.	Q ₁	301.285	988.466
Do.	Top of cap over same	164.423	539.444	Near Junction City, Ky.	R ₁	313.322	1027.957
Do.	T. B. M. 172.	164.299	539.038	Do.	S ₁	289.539	949.929
Do.	T. B. M. 173.	166.235	545.389	Near Moreland, Ky.	T ₁	303.053	994.266
Bonnots Mill, Mo.	T. B. M. 174.	166.475	546.177	Moreland, Ky.	U ₁	333.488	1094.119
Do.	T. B. M. 175= Old R. R. B. M.	165.897	544.280	Near Moreland, Ky.	V ₁	292.084	958.279
Do.	P. B. M. 95= ²⁸ / ₁	162.261	532.351	McKinney, Ky.	W ₁	308.271	1011.386
Near Osage, Mo.	Top of cap over same	163.500	535.416	Near McKinney, Ky.	X ₁	278.428	913.476
Do.	T. B. M. 178= Old B. M. 81.	165.939	544.418	Near Kings Mountain, Ky.*	Y ₁	305.038	1000.779
Do.	T. B. M. 177= Old B. M. 80.	165.963	544.497	Kings Mountain, Ky.	Z ₁	353.306	1159.138
Near Bonnots Mill, Mo.	P. B. M. 96.	167.209	548.585	Waynesburg, Ky.	A ₂	369.514	1212.814
Near Osage, Mo.	T. B. M. 179.	165.318	542.381	Eubank, Ky.	B ₂	356.137	1168.426
Near Osage City, Mo.	P. B. M. 97.	164.338	539.166	Floyd, Ky.	C ₂	340.398	1116.789
Do.	Top of cap over same	165.580	543.240	Near Pulaski, Ky.	D ₂	340.566	1117.340
Osage City, Mo.	T. B. M. 180= Old R. R. B. M.	165.774	543.877	Science Hill, Ky.	E ₂	342.904	1125.011
Do.	P. B. M. 98.	166.618	546.646	Norwood, Ky.	F ₂	326.951	1072.672
Do.	T. B. M. 182= Old R. R. B. M.	166.623	546.662	Near Somerset, Ky.	G ₂	292.241	958.794
Do.	P. B. M. 99.	167.026	547.984	Somerset, Ky.	A ₃	262.024	859.657
Do.	Top of cap over same	168.265	552.049	Do.	B ₃	268.005	879.280
Do.	T. B. M. 183.	168.526	552.906	Do.	C ₃	272.108	892.741
Near Osage City, Mo.	T. B. M. 184= Old R. R. B. M.	170.250	558.562	Do.	D ₃	268.363	880.454
Do.	P. B. M. 100= ²⁹ / ₁	165.206	542.013	Near Burnside, Ky.	E ₃	249.177	817.508
Ewings Landing, Mo.	Top of cap over same	166.450	546.095	Burnside, Ky.	F ₃	235.332	772.085
Near Jefferson City, Mo.	P. B. M. 101.	177.115	581.085	Near Sloans Valley, Ky.	G ₃	280.439	920.074
Do.	P. B. M. 102.	174.045	571.013	Alpine, Ky.	H ₃	290.058	951.632
Do.	Top of cap over same	175.282	575.071	Greenwood, Ky.	I ₃	363.515	1192.632
Do.	T. B. M. 190.	174.124	571.272	Flat Rock, Ky.	J ₃	393.551	1291.175
Do.	T. B. M. 191.	168.000	550.459	Whitley, Ky.	K ₃	401.546	1317.406
Do.	T. B. M. 192.	169.612	556.469	Pine Knot, Ky.	L ₃	430.209	1411.444
Do.	P. B. M. 102.	166.976	547.820	Between Strunk, Ky., and Isham, Tenn.	M ₃	415.308	1362.556
Do.	Top of cap over same	168.214	551.882	Near Winfield, Tenn.	A	396.250	1300.030
Jefferson City, Mo.	T. B. M. 193= Old B. M. 88.	169.669	556.656	Oneida, Tenn.	B	438.584	1438.921
Near Jefferson City, Mo.	P. B. M. 104.	170.371	558.889	Helenwood, Tenn.	C	422.928	1387.556
Do.	T. B. M. 194.	169.490	556.036	New River, Tenn.	D	367.076	1204.315
Jefferson City, Mo.	T. B. M. 195.	169.227	555.206	Robbins, Tenn.	E	419.437	1376.103
Do.	T. B. M. 196. Gauge B. M. 1st.	169.365	555.658	Glenn Mary, Tenn.	F	389.141	1276.707
Newport, Ky.	A.	156.192	512.440	Sunbright, Tenn.	G	407.657	1337.455
Do.	U. S. E.	152.534	500.439	Annadel, Tenn.	H	375.500	1231.953
Covington, Ky.	B.	156.548	513.608	Lancing, Tenn.	I	359.921	1180.841
Ludlow, Ky.	C.	162.134	531.935	Near Nemo, Tenn.	J	255.000	836.612
Crescent Springs, Ky.	D.	237.475	779.116	Oakdale, Tenn.	K	241.353	791.839
Erlanger, Ky.	E.	279.016	915.405	Do.	L	242.012	794.001
Dixon, Ky.	F.	282.004	925.208	Elverton, Tenn.	M	248.942	816.737
Richwood, Ky.	G.	286.150	938.810	Wheat, Tenn.	N	272.707	894.706
Walton, Ky.	H.	278.533	913.820	Near Williams Ferry, Tenn.	Melton Δ	413.109	1355.342
Near Crittenden, Ky.	I.	273.038	895.792	Oliver Springs, Tenn.	O	238.952	783.962
Crittenden, Ky.	J.	281.565	923.768	Dosssett, Tenn.	P	275.790	904.821
Sherman, Ky.	K.	284.000	934.677	Clinton, Tenn.	Q	253.505	831.708
Dry Ridge, Ky.	L.	292.011	958.039	Heiskell, Tenn.	R	274.822	901.645
Williamstown, Ky.	M.	297.064	974.617	Powell, Tenn.	S	302.978	994.020
Mason, Ky.	N.	278.908	915.051	Black Oak, Tenn.	T	336.082	1102.629
Blanchett, Ky.	O.	286.971	941.504	Near Harriman, Tenn.†	A ₄	234.340	768.830
Corinth, Ky.	P.	292.271	958.892	Harriman, Tenn.	B ₄	242.094	794.270
Hinton, Ky.	Q.	290.606	953.430	Do.	C ₄	241.489	792.285
Sadleville, Ky.	R.	261.700	858.594	Do.	City	239.572	785.996
Near Sadleville, Ky.	S.	263.843	865.625	Near Emory Gap, Tenn.	D ₄	254.791	835.927
Rogers Gap, Ky.	T.	275.398	903.535	Cardiff, Tenn.	E ₄	241.908	793.660
Near Kinkaid, Ky.	U.	255.070	836.842	Rockwood, Tenn.	F ₄	267.727	878.368
Near Georgetown, Ky.	V.	260.848	855.799	Do.	G ₄	268.237	890.041
Georgetown, Ky.	W.	267.325	877.049	Glen Alice, Tenn.	H ₄	242.640	796.061
Near Donerall, Ky.	X.	265.403	870.743	Roddy, Tenn.	I ₄	235.270	771.882
Greendale, Ky.	Y.	285.248	935.851	Lorraine, Tenn.	J ₄	244.741	802.954
Hillenmeyer, Ky.	Z.	286.354	939.480	Near Spring City, Tenn.	K ₄	233.412	765.786
Lexington, Ky.	A ₁	298.568	979.552	Near Sheffield, Tenn.	L ₄	247.974	813.561
Near Lexington, Ky.	B ₁	308.166	1011.041	Near Evansville, Tenn.	M ₄	231.314	758.903
Brannon, Ky.	C ₁	313.527	1028.630	Do.	N ₄	226.445	742.928
Near Brannon, Ky.	D ₁	297.197	975.054	Dayton, Tenn.	O ₄	215.431	706.793
Nicholasville, Ky.	E ₁	289.917	951.169	Do.	P ₄	214.092	702.400
Do.	F ₁	288.655	947.029	Near Graysville, Tenn.	Q ₄	232.702	763.456
Jessamine, Ky.	G ₁	269.934	885.608	Do.	R ₄	215.913	708.375
Wilmore, Ky.	H ₁	267.670	878.181	Sale Creek, Tenn.	S ₄	223.545	733.414
Near High Bridge, Ky.	I ₁	273.423	897.055	Near Retro, Tenn.	T ₄	222.048	728.502
				Rathburn, Tenn.	U ₄	235.280	771.914
				Daisy, Tenn.	V ₄	219.688	720.760
				Near Cave Springs, Tenn.	W ₄	206.621	677.889
				Do.	X ₄	207.088	679.421
				Hixson, Tenn.	Y ₄	207.337	680.238
				Near Boyce, Tenn.	Z ₄	209.989	688.939
				Do.	A ₅	209.962	688.850
				Near Chattanooga, Tenn.	B ₅	203.887	668.919

* Mr. G. B. Nicholson, chief engineer of the Chicago, New Orleans & Texas Pacific Railroad, on June 20, 1904, stated that bench mark Y₁, near Kings Mountain, Ky., would probably be destroyed soon by improvements.

† Described as near Harriman Junction, Tenn. See p. 630 of Appendix 3, Report for 1903.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Chattanooga, Tenn.	C ₁	206.257	676.695	Tuscumbia, Ala.	T. B. M. 79.....	137.238	450.255
Do.	Gauge.....	205.485	674.162	Do.	T. B. M. 80.....	142.768	468.398
Near Chattanooga, Tenn.	D ₁	201.407	660.783	Do.	P. B. M. 8.....	146.353	480.140
Wauhatchie, Tenn.	674N.....	203.784	668.581	Do.	P. B. M. 9.....	143.183	469.760
Hooker, Ga.	E ₁	261.167	856.845	Near Florence, Ala.	T. B. M. 86.....	141.332	463.887
Near Whiteside, Tenn.	974N.....	295.851	970.638	Do.	P. B. M. 10.....	134.548	441.430
Whiteside, Tenn.	F ₁	211.552	694.389	Florence, Ala.	T. B. M. 87.....	137.313	450.501
Near Shellmound, Tenn.	639N.....	193.951	636.321	Do.	Old Gauge B. M.	131.383	431.046
Shellmound, Tenn.	U. S.	189.917	623.086	Do.	P. B. M. 11.....	131.594	431.738
Do.	G ₁	189.178	620.661	Do.	P. B. M. 12.....	131.694	432.066
Near Carpenter, Ala.	665N.....	201.740	661.875	Do.	T. B. M. 90.....	139.849	458.821
Near Bridgeport, Ala.	C.....	189.429	621.485	Do.	P. B. M. 13.....	139.249	456.853
Do.	U. S. E.	189.432	621.485	East Florence, Ala.	P. B. M. 14.....	144.043	472.581
Bridgeport, Ala.	679N.....	205.867	675.415	Near East Florence, Ala.	T. B. M. 93.....	133.199	437.193
Bolivar, Ala.	D.....	187.915	616.518	Do.	P. B. M. 15.....	135.023	442.988
Near Bolivar, Ala.	625N.....	189.416	621.442	Do.	P. B. M. 16.....	133.129	437.748
Stevenson, Ala.	627N.....	190.225	624.097	Near Bainbridge, Ala.	P. B. M. 17.....	130.713	428.848
Near Stevenson, Ala.	E.....	184.571	605.547	Do.	T. B. M. 99.....	131.314	430.819
Near Cedar Grove, Ala.	F.....	185.276	607.860	Bainbridge, Ala.	P. B. M. 18.....	133.954	439.481
Near Fackler, Ala.	G.....	183.343	601.518	Lock 9, Muscle Shoals Canal, Ala.	T. B. M. 102.....	132.980	436.285
Do.	H.....	184.337	604.779	Do.	P. B. M. 19.....	132.986	436.305
Hollywood, Ala.	I.....	195.160	640.287	Lock 8, Muscle Shoals Canal, Ala.	T. B. M. 103.....	136.053	446.367
Near Hollywood, Ala.	J.....	192.073	630.160	Do.	P. B. M. 20.....	136.058	446.384
Scottsboro, Ala.	K.....	198.685	651.852	Lock 7, Muscle Shoals Canal, Ala.	T. B. M. 104.....	135.030	444.842
Near Larkinsville, Ala.	L.....	198.343	650.730	Do.	P. B. M. 21.....	139.703	458.342
Do.	M.....	187.436	614.946	Near Lock 7, Muscle Shoals Canal, Ala.	P. B. M. 22.....	139.552	457.847
Lim Rock, Ala.	N.....	187.352	614.671	Do.	T. B. M. 105.....	139.941	459.123
Near Lim Rock, Ala.	O.....	203.119	666.400	Lock 6, Muscle Shoals Canal, Ala.	T. B. M. 107.....	142.442	467.328
Near Swearengin, Ala.	P.....	219.461	720.015	Do.	P. B. M. 23.....	143.659	471.321
Swearengin, Ala.	Q.....	413.871	1357.842	Near Lock 6, Muscle Shoals Canal, Ala.	T. B. M. 108.....	143.416	470.524
Near Swearengin, Ala.	Gunter A.....	412.272	1352.596	Do.	P. B. M. 24.....	143.721	471.525
Do.	Gunter N.....	412.432	1353.121	Do.	T. B. M. 109.....	143.601	471.131
Do.	Gunter S.....	412.368	1352.911	Near Lock 5, Muscle Shoals Canal, Ala.	P. B. M. 25.....	143.760	471.653
Do.	Gunter E.....	412.375	1352.934	Do.	T. B. M. 113.....	147.300	483.267
Do.	Gunter W.....	412.370	1352.917	Lock 5, Muscle Shoals Canal, Ala.	P. B. M. 26.....	147.294	483.247
Woodville, Ala.	J ₂	187.340	614.631	Do.	P. B. M. 27.....	147.321	483.330
Do.	K ₁	188.708	619.119	Near Lock 5, Muscle Shoals Canal, Ala.	T. B. M. 114.....	147.169	482.837
Near Woodville, Ala.	L ₁	187.730	615.911	Do.	P. B. M. 28.....	148.392	489.849
Do.	T. B. M. 1.....	184.001	603.677	Near Lock 4, Muscle Shoals Canal, Ala.	P. B. M. 29.....	150.390	493.372
Paint Rock, Ala.	M ₁	182.062	597.315	Do.	P. B. M. 30.....	152.219	499.405
Gurley, Ala.	N ₁	196.126	643.457	Lock 3, Muscle Shoals Canal, Ala.	T. B. M. 118.....	154.050	505.412
Near Gurley, Ala.	T. B. M. 8.....	187.814	616.186	Do.	P. B. M. 31.....	154.042	505.280
Brownsboro, Ala.	O ₁	192.825	632.627	Near Lock 3, Muscle Shoals Canal, Ala.	T. B. M. 119.....	154.137	505.698
Near Brownsboro, Ala.	T. B. M. 12.....	197.192	646.954	Lock 2, Muscle Shoals Canal, Ala.	T. B. M. 120.....	154.690	507.512
Near Fearn, Ala.	P ₁	244.570	802.393	Lock 2, Muscle Shoals Canal, Ala.	T. B. M. 121.....	155.896	511.469
Huntsville, Ala.	Q ₁	194.738	638.903	Do.	P. B. M. 32.....	155.898	511.475
Do.	City.....	193.801	635.829	Near Lock 2, Muscle Shoals Canal, Ala.	P. B. M. 33.....	156.494	513.431
Near Madison, Ala.	R ₁	188.894	619.730	Lock 1, Muscle Shoals Canal, Ala.	T. B. M. 125.....	158.910	521.357
Madison, Ala.	S ₁	205.394	673.863	Lock 1, Muscle Shoals Canal, Ala.	P. B. M. 34.....	158.916	521.377
Near Greenbrier, Ala.	T ₁	178.500	585.629	Near Lock 1, Muscle Shoals Canal, Ala.	T. B. M. 126.....	158.830	521.095
Near Belle Mina, Ala.	T. B. M. 38.....	178.379	585.232	Near Lambs Ferry, Ala.	T. B. M. 128.....	156.924	514.841
Belle Mina, Ala.	U ₁	183.058	600.583	Sycamore Landing, Ala.	P. B. M. 35.....	160.221	525.658
Near Belle Mina, Ala.	T. B. M. 39.....	174.649	572.994	Do.	P. B. M. 36.....	161.234	528.982
Decatur, Ala.	P. B. M. 52.....	173.194	568.221	Near Lock B, Elk River Canal, Ala.	P. B. M. 37.....	163.384	536.036
Do.	P. B. M. 51.....	172.414	565.662	Do.	P. B. M. 38.....	166.565	546.472
Do.	P. B. M. 50.....	169.596	556.416	Lock B, Elk River Canal, Ala.	T. B. M. 140.....	161.472	529.763
Near Flint, Ala.	V ₁	173.105	567.929	Do.	P. B. M. 39.....	161.476	529.776
Near Hartsells, Ala.	W ₁	201.182	660.045	Lock A, Elk River Canal, Ala.	P. B. M. 40.....	164.112	538.424
Near Leesdale, Ala.	T. B. M. 60.....	181.063	594.038	Do.	T. B. M. 141.....	164.578	539.853
Near Falkville, Ala.	X ₁	183.227	601.137	Near Lock A, Elk River Canal, Ala.	P. B. M. 41.....	163.634	536.856
Near Wilhite, Ala.	Y ₁	205.780	675.130	Do.	P. B. M. 42.....	164.112	538.424
Near Cullman, Ala.	Z ₁	261.371	857.515	Do.	T. B. M. 142.....	163.341	535.895
Cullman, Ala.	A ₁	244.655	802.672	Near Miltons Bluff, Ala.	P. B. M. 43.....	163.798	537.394
Johnson, Ala.	B ₁	198.258	650.451	Miltons Bluff, Ala.	T. B. M. 143.....	163.360	535.957
Near Hanceville, Ala.	C ₁	161.700	530.511	Near Milton's Bluff, Ala.	T. B. M. 146.....	164.335	539.156
Near Garden City, Ala.	D ₁	130.113	426.879	Near Browns Ferry, Ala.	P. B. M. 44.....	164.742	540.491
Near Blount Springs, Ala.	E ₁	138.764	455.262	Do.	P. B. M. 45.....	166.256	545.458
Do.	F ₁	124.247	407.634	Do.	P. B. M. 46.....	166.472	546.167
Reids, Ala.	G ₁	179.288	588.214	Near Finleys Landing, Ala.	P. B. M. 47.....	167.294	548.864
Warrior, Ala.	H ₁	166.942	547.709	Deatur, Ala.	T. B. M. 176.....	164.261	538.913
Near Warrior, Ala.	I ₁	125.781	412.666	Do.	P. B. M. 48.....	165.031	541.439
Morris, Ala.	J ₁	126.072	413.621	Do.	P. B. M. 49.....	167.122	548.299
Near Cunningham, Ala.	T. B. M. 107.....	120.682	395.938				
Newcastle, Ala.	K ₁	157.603	517.069				
Boyles, Ala.	L ₁	178.104	584.329				
Burnsville, Miss.	P. B. M. 1.....	143.264	470.025				
Do.	P. B. M. 2.....	141.801	465.225				
Iuka, Miss.	P. B. M. 3.....	172.163	564.838				
Near Pogram, Ala.	T. B. M. 41.....	132.073	433.310				
Near Riverton Junction, Ala.	T. B. M. 43.....	126.122	413.785				
Margerum, Ala.	T. B. M. 45.....	133.156	436.803				
Near Margerum, Ala.	T. B. M. 47.....	134.769	442.155				
Near Cherokee, Ala.	T. B. M. 49.....	148.810	488.221				
Near Barton, Ala.	T. B. M. 58.....	151.030	495.504				
Barton, Ala.	T. B. M. 59.....	147.081	482.548				
Near Prides, Ala.	T. B. M. 63.....	131.266	430.662				
Prides, Ala.	T. B. M. 72.....	130.865	429.346				
Do.	P. B. M. 7.....	128.787	422.329				
Do.	T. B. M. 73.....	127.746	419.113				
Near Prides, Ala.	T. B. M. 68.....	148.768	488.083				
Do.	T. B. M. 71.....	138.016	452.807				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Decatur, Ala.	U. S.	*173.028	567.676	West Cairo, Ohio	S ₁	248.296	814.618
Do.	Old Railroad B. M.	†173.258	568.431	Near Lima, Ohio	T ₁	254.934	836.396
Do.	Old Railroad B. M.	†172.882	567.197	Lima, Ohio	U ₁	267.941	879.070
				Do.	V ₁	267.447	877.449
Riverton, Ala.	P. B. M. 4	122.061	400.462	Do.	Lima City	266.001	872.705
Near Riverton, Ala.	Lift lock center line stone 3.	118.587	389.064	Near Cridersville, Ohio	W ₁	264.854	868.942
Do.	P. B. M. 5	126.250	414.205	Cridersville, Ohio	X ₁	272.001	892.390
Do.	P. B. M. 6	128.626	422.000	Near Wapakoneta, Ohio	Y ₁	270.087	886.110
Do.	P. B. M. 53	123.381	404.792	Wapakoneta, Ohio	Z ₁	273.869	898.519
Near Paynes Landing, Ala.	P. B. M. 54	121.546	398.772	Near Wapakoneta, Ohio	A ₁	279.170	915.910
Near Indian Creek, Miss.	P. B. M. 55	126.434	414.809	Botkins, Ohio	B ₁	306.320	1004.985
Bugs Landing, Miss.	P. B. M. 56	113.242	371.528	Anna, Ohio	C ₁	314.063	1030.388
Near Bugs Landing, Miss.	P. B. M. 57	118.079	387.398	Swanders, Ohio	D ₁	308.838	1013.246
Near Yellow Creek, Tenn.	P. B. M. 58	124.153	407.325	Near Swanders, Ohio	E ₁	306.640	1006.035
Do.	P. B. M. 59	112.609	369.451	Sidney, Ohio	F ₁	305.033	1000.762
Near Boyds Landing, Tenn.	P. B. M. 60	122.507	401.925	Do.	Sidney City	291.713	957.062
Near Hamburg Landing, Tenn.	Old P. B. M. 1	107.194	351.686	Near Sidney, Ohio	G ₁	293.424	962.675
Pittsburg Landing, Tenn.	Old P. B. M. 2	118.173	387.706	Kirkwood, Ohio	H ₁	293.168	961.835
Do.	P. B. M. 61	128.384	421.206	Near Piqua, Ohio	I ₁	300.562	986.094
				Piqua, Ohio	J ₁	284.762	934.257
				Do.	K ₁	274.000	898.948
Decatur, Ala.	M ₁	176.194	578.063	Do.	Penn. R. R.	263.783	865.428
Do.	N ₁	182.277	598.020	Farrington, Ohio	L ₁	267.269	878.565
Do.	O ₁	180.088	590.839	Near Troy, Ohio	M ₁	260.669	855.212
Trinity, Ala.	P ₁	193.219	633.919	Troy, Ohio	N ₁	257.410	844.519
Hillsboro, Ala.	Q ₁	182.355	598.276	Do.	O ₁	254.642	835.438
Do.	R ₁	183.193	601.026	Do.	P ₁	256.352	841.048
Courtland, Ala.	S ₁	172.986	567.538	Do.	Troy City	255.327	837.685
Do.	T ₁	172.661	566.472	Near Troy, Ohio	Q ₁	253.334	831.147
Near Courtland, Ala.	U ₁	167.594	549.848	R ₁	R ₁	252.155	827.279
Near Town Creek, Ala.	V ₁	165.102	541.672	Do.	S ₁	247.753	812.536
Leighton, Ala.	W ₁	174.482	572.446	Tippecanoe City, Ohio	T ₁	245.953	806.931
Near Tusculumbia, Ala.	X ₁	155.734	510.937	Do.	U ₁	244.209	801.209
Near Prides, Ala.	Y ₁	134.618	441.659	Near Tippecanoe City, Ohio	V ₁	242.995	797.226
Near Cherokee, Ala.	Z ₁	164.090	538.352	Tadmor, Ohio	W ₁	241.105	791.025
Near Margerum, Ala.	A ₁	134.137	440.081	Near Tadmor, Ohio	X ₁	235.737	773.414
Near Riverton Junction, Ala.	B ₁	126.432	414.802	Near Dayton, Ohio	Y ₁	230.024	754.670
Do.	C ₁	132.074	433.313	Dayton, Ohio	Z ₁	226.900	744.421
Near Burnsville, Miss.	A ₁	164.179	538.644	Do.	Dayton City	226.690	743.732
Near Corinth, Miss.	B ₁	146.645	481.118	Do.	A ₁	226.599	743.434
Corinth, Miss.	T. B. M. 1	†137.004	449.487	Do.	B ₁	226.792	744.067
Do.	C ₁	136.675	448.408	Near Dayton, Ohio	E ₁	224.538	736.672
				Do.	C ₁	222.009	728.374
South Rockwood, Mich.	A	179.020	587.335	Near Alexandria, Ohio	D ₁	220.114	722.157
Newport, Mich.	B	176.906	580.399	Near Whitfield, Ohio	D ₁	217.722	714.310
Monroe, Mich.	C	177.109	581.065	Carrollton, Ohio	C ₁	216.843	711.426
Do.	P. B. M. M. C.	178.072	584.225	Miamisburg, Ohio	B ₁	215.730	707.774
Do.	Bridge.			Near Miamisburg, Ohio	F ₁	213.278	699.730
Near La Salle, Mich.	D	180.067	590.770	Miamisburg, Ohio	F ₁	212.441	696.983
Vienna, Mich.	E	177.492	582.322	Do.	A ₁	214.922	705.123
Alexis, Ohio	F	179.475	588.828	Near Miamisburg, Ohio	G ₁	211.457	693.755
Toledo, Ohio	U	178.455	585.481	Near Franklin, Ohio	Z ₁	214.614	704.113
Do.	Toledo City, No. 165.	181.799	596.419	Near Carlisle, Ohio	H ₁	210.946	692.079
Do.	Park A.	183.221	601.118	Franklin, Ohio	I ₁	209.997	696.983
Do.	V	179.563	589.116	Near Carlisle, Ohio	J ₁	206.550	677.656
Do.	Power House	177.608	582.702	Near Franklin, Ohio	Y ₁	208.621	684.451
Do.	W	184.065	603.887	Near Poasttown, Ohio	K ₁	200.647	658.289
Do.	Post Office	183.661	602.561	Near Middletown, Ohio	X ₁	205.648	674.697
Do.	Toledo City, No. 44.	181.774	596.370	Heno, Ohio	L ₁	195.998	643.037
Do.	Toledo City, No. 296.	179.940	590.353	Middletown, Ohio	M ₁	203.150	666.501
Near Perrysburg, Ohio	X	183.834	603.129	Excelsio Mills, Ohio	W ₁	194.534	638.234
Perrysburg, Ohio	Y	187.665	615.698	Near Trenton, Ohio	N ₁	192.941	633.007
Roachton, Ohio	Z	197.357	647.594	Le Sourdsville, Ohio	V ₁	190.481	624.936
Hull Prairie, Ohio	A ₁	201.325	660.514	Near Overpeck, Ohio	O ₁	193.656	635.353
Haskins, Ohio	B ₁	203.516	667.702	Near Rockdale, Ohio	U ₁	192.130	630.346
Tontogany, Ohio	C ₁	204.067	669.510	Near Hamilton, Ohio	P ₁	182.164	597.650
Weston, Ohio	D ₁	208.365	683.611	Near Woodsdale, Ohio	T ₁	188.047	616.951
Do.	E ₁	208.089	682.705	Hamilton, Ohio	Q ₁	180.167	591.098
Do.	Weston Village	207.883	682.029	Do.	Hamilton City	183.377	601.629
Milton Center, Ohio	F ₁	210.259	689.825	Do.	R ₁	184.501	605.317
Custar, Ohio	G ₁	212.335	696.636	Do.	S ₁	181.662	596.003
Deshler, Ohio	H ₁	217.541	713.716	Near Hamilton, Ohio	Telegraph Pole 745	186.007	610.258
Do.	I ₁	217.365	713.138	Do.	F ₁	183.593	602.338
Belmore, Ohio	J ₁	224.547	736.701	Near Flockton, Ohio	P. R. R. No. 24	186.893	613.165
Leipsic, Ohio	K ₁	233.466	765.963	Do.	P. R. R. No. 23	184.602	605.648
Do.	L ₁	232.777	763.703	Near Jones, Ohio	G ₁	194.765	638.991
Near Ottawa, Ohio	M ₁	226.679	743.696	Port Union, Ohio	P. R. R. No. 21	181.689	596.091
Ottawa, Ohio	N ₁	222.303	729.339	Near Crescentville, Ohio	P. R. R. No. 20	179.652	589.408
Near Columbus Grove, Ohio	O ₁	227.516	746.442	Near Crestview, Ohio	H ₁	197.169	646.879
Columbus Grove, Ohio	P ₁	234.999	770.993	Near Crescentville, Ohio	P. R. R. No. 19	176.529	579.162
Do.	Q ₁	236.500	775.917	Near Port Union, Ohio	P. R. R. No. 17	174.865	573.703
Near Monroe, Ohio	R ₁	240.925	790.435	Near Glendale, Ohio	I ₁	185.075	607.200
				Do.	J ₁	174.744	573.306
				Lockland, Ohio	T ₁	174.982	574.087
				Rensselaer, Ohio	K ₁	164.284	538.988
				Carthage, Ohio	L ₁	168.068	551.403
				Do.	S ₁	168.026	551.265
				St. Bernard, Ohio	R ₁	167.138	548.352

* This elevation is the result of leveling up to and including 1900. In October, 1901, this bench mark was reported as disturbed.

† 1895.

‡ 1901. According to observer's note in 1901 the bench mark may have been disturbed or may not have been correctly identified.

§ Bench mark apparently settled. Elevation from leveling of 1901 only.

¶ Destroyed.

‡ No description available.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Ivorydale, Ohio.	M ₁	152.243	499.484	Milwaukee, Wis.	B. M. 1.	†180.754	593.024
Winston Springs, Ohio.	U. S. G. S. No. 498*	151.783	497.975	Do.	B. M. 2.	193.870	636.055
Cincinnati, Ohio.	Q ₁	164.984	541.285	Do.	B. M. 3.	194.227	637.065
Do.	N ₁	152.696	500.971	Do.	B. M. 4.	181.145	594.307
Do.	O ₁	149.857	491.656	Do.	B. M. 5 (1876)	179.999	590.547
Do.	Cincinnati City	153.716	504.317				
Do.	P ₁	166.208	545.301				
Do.	Reference mark to Cincinnati City No. 1.	168.223	551.912				
Do.	Y ₁	168.578	553.076	Detour, Mich.	P. B. M. Goetz	183.022	602.368
Do.	Z ₁	149.602	490.819	Do.	P. B. M. Detour 2.	178.775	586.531
Do.	Gauge B. M.	149.850	491.633	Do.	P. B. M. Terrett	182.788	599.097
Do.	U ₁	150.567	493.985	Do.	P. B. M. Detour 1.	180.500	611.875
				Do.	P. B. M. Detour 3.	180.216	591.259
Ludlow, Ky.	A ₁	162.500	533.135	Do.	P. B. M. Detour 4.	181.349	594.976
Cincinnati, Ohio.	V ₁	153.720	504.330	Do.	P. B. M. Detour 5.	179.973	590.461
Do.	U. S. H.	152.275	499.589	Do.	P. B. M. Boathouse.	177.448	582.177
Sedamsville, Ohio.	U. S. G. S.	149.863	491.676	Near Detour, Mich.	P. B. M. Caribou	194.902	639.441
Cincinnati, Ohio.	W ₁	150.718	494.481	Near Schlessler, Mich.	P. B. M. Schlessler	214.251	702.922
St. Joseph, Ohio.	X ₁	148.107	485.914	Raber, Mich.	P. B. M. Raber	177.529	582.443
Delhi, Ohio.	Canal Stone	148.657	487.719	Near Gatesville, Mich.	P. B. M. Gatesville.	218.008	717.495
Near Delhi, Ohio.	D ₁	150.620	494.159	Near Raber, Mich.	P. B. M. Hudson	207.335	680.232
North Bend, Ohio.	C ₁	149.890	491.764	Near Stalwart, Mich.	P. B. M. Tripp	207.510	680.806
Near Lawrenceburg, Ind.	D ₂	147.107	482.634	Near Sterlingville, Mich.	P. M. B. Fairview	209.473	687.246
Lawrenceburg, Ind.	E ₁	147.506	483.943	Do.	P. B. M. Campbell	191.357	627.810
				Kelden, Mich.	P. B. M. Munuscong	183.339	601.505
				Barbeau, Mich.	P. B. M. Barbeau	201.437	660.881
				Near McCarron, Mich.	P. B. M. Charlotte	183.548	602.190
				Near Rosedale, Mich.	P. B. M. Hinds	180.501	592.194
				Do.	P. B. M. Newcomb	178.244	584.789
				Near Sault Sainte Marie, Mich.	P. B. M. Riverside.	179.869	590.120
				Do.			
Gibraltar, Mich.	(1877)	177.555	582.528	Sault Sainte Marie, Mich.	P. M. B. Little	178.694	586.263
Do.	2 (1875)	178.322	585.045	Do.	P. B. M. Soo	188.907	619.772
Do.	1 (1898)	179.104	587.610	Do.	P. B. M. A.	184.730	609.068
Trenton, Mich.	2 (1898)	183.400	601.705	Do.	P. B. M. B.	179.414	588.627
Do.	(1877)	183.946	603.496	Do.	P. B. M. Meridian	185.268	607.833
Amherstburg, Ontario.	Gauge B. M.	176.532	579.172	Do.	P. B. M. Neesville	195.595	641.715
Near Sibleys, Mich.	P. B. M. 3.	180.887	593.400	Near Sault Sainte Marie, Mich.	P. B. M. 1.	195.710	642.092
Wyandotte, Mich.	P. B. M. 4.	178.533	585.737	Do.			
Do.	(1877)	178.730	586.383	Do.	P. B. M. Solomon	185.422	608.339
Ecorse, Mich.	P. B. M. 5.	178.241	584.779	Do.	P. B. M. Brush	184.014	603.719
Do.	P. B. M. 6.	176.380	578.673	Do.	P. B. M. 2.	195.486	641.357
Delray, Mich.	P. B. M. 7.	180.844	593.319	Do.	P. B. M. 3.	204.324	670.353
Detroit, Mich.	P. B. M. 8.	183.340	601.508	Near Brimley, Mich.	P. B. M. 4.	197.522	648.037
Do.	P. B. M. 9.	177.702	583.011	Brimley, Mich.	P. B. M. 3.	197.522	648.037
Do.	(1871)	178.252	584.815	Bay Mills, Mich.	P. B. M. Bay Mills.	185.800	609.379
Do.	P. B. M. 10.	180.688	592.807	Near Bay Mills, Mich.	P. B. M. Mission	194.062	636.685
Do.	P. B. M. 11.	179.089	587.561	Iroquois Point, Mich.	P. B. M. A.	188.496	618.424
Windmill Point, Mich.	P. B. M. 12.	178.070	584.218	Do.	P. B. M. Iroquois	189.596	622.033
Grossepoint, Mich.	P. B. M. 13.	180.466	592.079	Do.	L. H.		
Grossepoint Farms, Mich.	P. B. M. 35.	184.385	604.936	Do.	P. B. M. Old B. M.	189.801	622.705
Do.	P. B. M. 36.	184.741	606.104	Do.	P. B. M. Iroquois 1.	187.481	615.094
Near Roseville, Mich.	P. B. M. 37.	178.211	584.681	Do.	P. B. M. Iroquois.	185.336	609.057
Do.	P. B. M. 38.	177.117	581.091				
Do.	P. B. M. 39.	177.098	581.029	Escanaba, Mich.	B. M. 1 Escanaba (1874)	180.932	593.608
Near Mt. Clemens, Mich.	P. B. M. 40.	176.854	580.228	Do.	B. M. 3 (1876)	178.954	587.118
Do.	P. B. M. 41.	180.192	591.180	Near Maple Ridge, Mich.	B. M. 4 (1876)	202.371	659.221
New Baltimore, Mich.	P. B. M. 34.	179.910	590.255	Near Sands, Mich.	B. M. 5 (1876)	366.583	1,007.008
Do.	P. B. M. 33.	179.409	588.611	Marquette, Mich.	B. M. 6 (1876)	191.541	628.414
Do.	P. B. M. 32.	182.904	600.078	Do.	B. M. 1 Marquette (1871)	186.077	610.488
Near Fair Haven, Mich.	P. B. M. 31.	177.943	583.805	Do.			
Fair Haven, Mich.	P. B. M. 30.	177.850	583.496	Do.	B. M. 2 (1874)	185.925	609.989
Algonac, Mich.	P. B. M. 29.	178.278	584.900	Do.	B. M. 3 (1874)	185.901	609.910
Do.	P. B. M. 28.	178.354	585.150	Do.	B. M. 11 (1896)	189.183	620.678
Near Roberts Landing, Mich.	P. B. M. 27.	178.370	585.202				
Do.							
Marine City, Mich.	P. B. M. 26.	178.752	586.456	Olcott, N. Y.	P. B. M. 4.	79.018	259.245
Do.	P. B. M. 25.	179.271	588.158	Do.	P. B. M. 5.	87.266	286.335
Do.	P. B. M. 24.	179.786	589.848	Do.	P. B. M. 6.	76.155	249.832
East China, Mich.	P. B. M. 23.	180.089	590.842	Do.	P. B. M. 3.	83.512	273.989
St. Clair, Mich.	P. B. M. 22.	182.782	599.677	Do.	P. B. M. 2.	84.038	275.715
Do.	P. B. M. 21.	179.469	588.808	Do.	P. B. M. 1.	87.571	287.306
Do.	P. B. M. 20.	191.201	627.299	Near Newfane, N. Y.	T. B. M. 60.	95.839	314.399
Marysville, Mich.	P. B. M. 19.	179.836	590.012	Near Coomer, N. Y.	T. B. M. 59.	96.315	315.993
Do.	P. B. M. 18.	178.968	587.164	Near Wilson, N. Y.	T. B. M. 53.	93.220	305.939
Near Black River, Mich.	P. B. M. 17.	181.882	596.725	Wilson, N. Y.	P. B. M. Wilson	88.335	289.812
Port Huron, Mich.	P. B. M. 16.	181.437	595.265	Near Ransomville, N. Y.	T. B. M. 47.	95.271	312.568
Do.	P. B. M. 15.	182.704	599.421	Do.	T. B. M. 43.	97.760	320.734
Do.	P. B. M. 14.	182.924	600.143	Ransomville, N. Y.	P. B. M. Ransomville	99.996	327.086
Fort Gratiot, Mich.	L. H. (1877)	179.937	590.343	Do.	T. B. M. 41.	98.450	322.998
Lakeport, Mich.	P. B. M. Lakeport	181.493	595.448	Near Model City, N. Y.	T. B. M. 37.	100.249	328.900
Lexington, Mich.	P. B. M. Lexington 1	190.042	623.496	Model City, N. Y.	P. B. M. Model City	110.834	363.628
Do.	P. B. M. Lexington 2	188.864	619.631	Near Model City, N. Y.	T. B. M. 35.	126.195	414.025
Do.	P. B. M. Lexington 3	189.788	622.603	Lewiston, N. Y.	P. B. M. Lewiston	122.326	401.331
Do.	P. B. M. Lexington 4	186.795	612.843	Lewiston Heights, N. Y.	P. B. M. Lewiston Heights 2.	154.352	505.498
				Do.	T. B. M. 31.	161.824	530.918
Sand Beach, Mich.	U. S. B. M.	179.166	587.814	Near Lewiston Heights, N. Y.	P. B. M. Lewiston Heights 1.	183.146	600.872
Do.	U. S. B. M. A.	177.869	583.559				
Do.	U. S. B. M. B.	177.752	583.175	Near Niagara Falls, N. Y.	University	179.635	599.352
Do.	U. S. B. M. E.	177.762	583.207	Niagara Falls, N. Y.	P. B. M. Suspension Bridge.	178.118	584.375
Do.	U. S. B. M. Jenks	186.099	610.509	Do.	T. B. M. 24.	183.941	603.480
Do.	U. S. B. M. Bowlder in Harbor.	177.600	582.676	Do.	P. B. M. Echota	174.027	572.922
Mackinaw, Mich.	B. M. 1.	180.112	590.917	Do.	P. B. M. Niagara 1.	172.684	566.547
Do.	B. M. 2.	180.794	593.155	Do.	P. B. M. Niagara 2.	174.293	571.826
Do.	B. M. 3.	178.901	586.944	Near La Salle, N. Y.	P. B. M. Schoolhouse	175.341	575.265
Do.	B. M. R.	179.814	589.940				
Do.	B. M. 4.	178.046	584.139				

* Original disk missing, 1899.

† Destroyed.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
La Salle, N. Y.....	P. B. M. La Salle 2...	176.873	580.291	Near Schenectady, N. Y...	L. S. 24.....	71.598	234.901
Do.....	P. B. M. La Salle 1...	174.227	571.610	Schenectady, N. Y.....	L. S. 25.....	71.667	235.127
Near La Salle, N. Y.....	T. B. M. 16.....	174.721	573.230	Do.....	L. S. 26.....	70.999	232.936
Do.....	P. B. M. Wheatfield...	175.730	576.541	Do.....	L. S. 27.....	70.999	232.936
Near North Tonawanda, N. Y.	P. B. M. Crossing.....	174.491	572.476	Near Schenectady, N. Y...	L. S. 28.....	71.641	235.042
North Tonawanda, N. Y.	P. B. M. North Tonawanda 2.	176.425	578.821	Do.....	L. S. 29.....	73.029	239.596
Do.....	P. B. M. North Tonawanda 1.	176.720	579.789	Do.....	L. S. 30.....	73.959	242.647
Tonawanda, N. Y.....	P. B. M. Tonawanda 1	175.630	576.213	Do.....	L. S. 31.....	77.306	253.628
Do.....	P. B. M. Tonawanda 2	175.305	575.146	Near Pattersonville, N. Y.	19(1875)=L. S. 32..	76.489	250.948
Do.....	P. B. M. State Ditch.	175.307	575.153	Do.....	L. S. 33.....	78.722	258.274
Do.....	T. B. M. 11.....	178.590	585.924	Pattersonville, N. Y.....	L. S. 34.....	78.981	259.123
Pullman, N. Y.....	T. B. M. 9.....	184.129	604.097	Near Pattersonville, N. Y.	L. S. 35.....	79.023	259.261
Near Buffalo, N. Y.....	T. B. M. 8.....	184.045	603.821	Near Amsterdam, N. Y.	L. S. 36.....	78.788	258.490
Buffalo, N. Y.....	T. B. M. 7.....	183.979	603.604	Do.....	21(1875)=L. S. 37..	80.364	263.661
Do.....	P. B. M. St. John.....	180.450	592.026	Do.....	L. S. 38.....	80.387	263.736
Do.....	P. B. M. Guard Lock	175.763	576.649	Do.....	L. S. 39.....	82.808	271.679
Do.....	P. B. M. Black Rock.	176.850	580.215	Amsterdam, N. Y.....	L. S. 40.....	85.169	279.425
Do.....	P. B. M. International Bridge 2.	177.473	582.259	Do.....	L. S. 41.....	84.290	276.541
Do.....	P. B. M. International Bridge 1.	176.740	579.854	Do.....	L. S. 42.....	80.360	263.648
Do.....	P. B. M. Water Works	177.639	582.804	Near Amsterdam, N. Y.	24a(1875)=L. S. 43.	85.322	279.927
Do.....	P. B. M. Fire Station	177.344	581.836	Near Fort Hunter, N. Y.	L. S. 44.....	86.092	282.454
Do.....	L. H.....	179.863	590.101	Fort Hunter, N. Y.....	L. S. 45.....	90.800	297.900
Between Buffalo and Tonawanda, N. Y.	D. W. Cherry*.....	175.670	576.344	Near Fultonville, N. Y.	L. S. 46.....	91.531	300.298
Pendleton Center, N. Y...	D. W. Sawyers Creek	177.239	581.492	Do.....	L. S. 47.....	90.975	298.474
Do.....	D. W. Pendleton 1...	180.183	591.150	Fultonville, N. Y.....	L. S. 48.....	92.064	302.047
Do.....	D. W. Pendleton 2...	189.276	620.983	Near Fultonville, N. Y.	L. S. 49.....	91.420	299.934
Near Lockport, N. Y.....	D. W. Lockport 1, N. Y. 554.	179.935	590.337	Do.....	L. S. 50.....	91.253	299.388
Do.....	D. W. Lockport 2...	122.071	400.495	Do.....	L. S. 51.....	90.546	297.066
Lockport, N. Y.....	D. W. Lockport 3...	113.402	372.053	Do.....	L. S. 52.....	90.599	297.240
Wrights Corners, N. Y.	D. W. Wrights.....	123.242	404.336	Between Downing and Sprakers, N. Y.	L. S. 53.....	91.105	298.900
Near Newfane, N. Y.....	U. S. G. S.....	108.782	356.896	Sprakers, N. Y.....	L. S. 54.....	92.060	303.825
Newfane, N. Y.....	D. W. Newfane 1...	94.430	305.183	Do.....	29(1875)=L. S. 55..	93.063	305.324
Near Newfane, N. Y.....	D. W. Newfane 2...	100.662	330.255	Canajoharie, N. Y.....	L. S. 56.....	93.923	308.146
Near La Salle, N. Y.....	D. W. Monument.....	184.796	606.285	Do.....	31(1875)=L. S. 57..	93.410	306.463
Lewistown, N. Y.....	D. W. Lewiston 3...	110.748	363.346	Near Fort Plain, N. Y.	L. S. 58.....	93.696	307.401
Near Lewiston, N. Y.	D. W. Lewiston 4...	99.150	325.295	Do.....	L. S. 59.....	95.144	312.152
Do.....	D. W. Lewiston 5...	86.772	284.684	Fort Plain, N. Y.....	L. S. 60.....	95.779	314.235
Near Niagara Falls, N. Y.	D. W. Niagara 2...	172.827	567.017	Near Fort Plain, N. Y.	L. S. 61.....	95.625	313.730
On International Bridge, Ontario.	D. W. International Bridge 3.	176.625	579.477	Near St. Johnsville, N. Y.	L. S. 62.....	95.409	313.021
Fort Erie, Ontario.....	D. W. Fort Erie.....	173.918	570.596	Do.....	34(1875)=L. S. 63..	97.349	319.586
On Lake Erie, Ontario...	D. W. Lake Erie.....	177.442	582.158	St. Johnsville, N. Y.	L. S. 64.....	97.706	319.586
Detroit Junction, Mich...	U. S. B. M. Detroit Jct. (1877).	180.720	592.912	Near Mindenville, N. Y.	L. S. 65.....	99.259	325.652
New Haven, Mich.....	U. S. B. M. New Haven (1877).	192.330	631.003	Do.....	35a(1875)=L. S. 66..	100.024	328.162
Pine River, Mich.....	U. S. B. M. Pine River (1877).	191.729	629.031	Indian Castle, N. Y.	L. S. 67.....	102.085	334.924
Port Colborne, Ontario...	B. M. Custom-house.	178.150	584.480	Near Indian Castle, N. Y.	L. S. 68.....	102.663	336.820
Do.....	B. M. Baptist Church	178.870	580.281	Little Falls, N. Y.	37(1875)=L. S. 69..	104.695	345.487
Do.....	B. M. Church of England.	176.428	578.831	Do.....	L. S. 70.....	107.755	353.528
Port Dalhousie, Ontario...	B. M. A.....	80.433	263.887	Do.....	L. S. 71.....	110.691	363.159
Do.....	B. M. B.....	78.610	257.906	Do.....	L. S. 72.....	113.754	373.208
Do.....	B. M. C.....	78.665	258.087	Near Little Falls, N. Y.	38a(1875)=L. S. 73..	115.296	378.267
Rensselaer, N. Y.....	L. S. 1.....	4.242	13.917	Do.....	L. S. 74.....	116.154	381.082
Do.....	L. S. 2.....	7.974	26.161	Do.....	L. S. 75.....	118.619	389.169
Do.....	L. S. 3.....	6.502	21.332	Near Herkimer, N. Y.	39a(1875)=L. S. 76..	119.886	393.326
East Albany, N. Y.	1(1875)=L. S. 4.....	8.008	26.273	Herkimer, N. Y.....	L. S. 77.....	120.241	394.491
Albany, N. Y.....	2(1875)=L. S. 5.....	5.128	16.824	Mohawk, N. Y.....	L. S. 78.....	119.826	393.129
Do.....	L. S. 6.....	7.987	26.204	Near Mohawk, N. Y.	L. S. 79.....	121.436	398.411
Near Albany, N. Y.	L. S. 7.....	9.157	30.043	Do.....	L. S. 80.....	124.358	407.998
Watervliet, N. Y.....	L. S. 8.....	7.841	25.725	Ilion, N. Y.....	L. S. 81.....	124.751	409.287
Near Watervliet, N. Y.	6(1875)=L. S. 9.....	14.936	49.003	Do.....	L. S. 82.....	124.525	408.546
Cohoes, N. Y.....	7a(1875)=L. S. 10..	21.252	69.724	Near Ilion, N. Y.....	L. S. 83.....	127.240	417.453
Do.....	8a(1875)=L. S. 11..	48.710	159.809	Frankfort, N. Y.....	L. S. 84.....	130.249	427.325
Near Cohoes, N. Y.	L. S. 12.....	57.936	190.078	Do.....	41(1875)=L. S. 85..	137.624	418.713
Crescent, N. Y.....	L. S. 13.....	58.610	192.290	Near Frankfort, N. Y.	L. S. 86.....	131.777	432.338
Near Crescent, N. Y.	L. S. 14.....	59.320	194.619	Near Utica, N. Y.....	L. S. 87.....	130.356	427.076
Do.....	L. S. 15.....	58.837	193.034	Do.....	L. S. 88.....	131.470	431.331
Near Viscchers Ferry, N. Y.	L. S. 16.....	58.613	192.299	Do.....	L. S. 89.....	131.533	431.538
Do.....	L. S. 17.....	58.141	190.751	Do.....	L. S. 90.....	130.367	427.712
Do.....	12(1875)=L. S. 18..	58.177	190.869	Do.....	L. S. 91.....	131.563	431.636
Vischers Ferry, N. Y.	L. S. 19.....	61.958	203.274	Near Utica, N. Y.	L. S. 92.....	131.189	430.409
Fondas Basin, N. Y.	L. S. 20.....	64.698	212.263	Whitesboro, N. Y.....	L. S. 93.....	132.805	435.711
Rexford Flats, N. Y.	L. S. 21.....	67.520	221.522	Do.....	L. S. 94.....	132.188	433.687
Do.....	L. S. 22.....	70.540	231.430	Near Oriskany, N. Y.	L. S. 95.....	132.578	434.966
Near Rexford Flats, N. Y.	L. S. 23.....	70.508	231.325	Do.....	L. S. 96.....	133.062	436.554
				Oriskany, N. Y.....	L. S. 97.....	132.271	433.959
				Near Oriskany, N. Y.	L. S. 98.....	132.830	435.793
				Do.....	L. S. 99.....	132.011	433.106
				Stanwix, N. Y.....	L. S. 100.....	133.589	437.627
				Rome, N. Y.....	L. S. 101.....	132.132	433.503
				Do.....	L. S. 102.....	132.920	436.088
				Near Rome, N. Y.	L. S. 103.....	132.669	435.265
				Do.....	L. S. 104.....	132.016	433.122
				Do.....	L. S. 105.....	132.707	435.390
				New London, N. Y.	L. S. 106.....	132.091	435.337
				Stacys Basin, N. Y.	L. S. 107.....	132.785	435.645
				Do.....	49(1875)=L. S. 108..	132.243	433.867
				Near Higginsville, N. Y.	51(1875)=L. S. 109..	131.384	431.049
				Higginsville, N. Y.	L. S. 110.....	132.062	433.273
				Near Higginsville, N. Y.	L. S. 111.....	114.385	375.278
				Sylvan Junction, N. Y.	L. S. 112.....	114.915	377.017
				Near Bay, N. Y.....	L. S. 113.....	118.023	387.214
				North Bay, N. Y.	L. S. 114.....	128.662	422.119
				Cleveland, N. Y.....	L. S. 115.....	120.324	394.763
				Do.....	L. S. 116.....	128.933	423.008
				Bernhardts Bay, N. Y.	L. S. 117.....	117.843	386.623

* This bench mark may be identical with N. Y. 543. (See page 102.) If found to be the same the mean of the two elevations should be used.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Constantia, N. Y.	L. S. 118.	119.992	393.674	Troy, N. Y.	N. Y. 13.	8.176	26.824
Near Constantia, N. Y.	L. S. 119.	125.186	410.714	Near Green Island, N. Y.	N. Y. 14.	11.484	37.677
West Monroe, N. Y.	L. S. 120.	120.427	395.101	Do.	N. Y. 15.	14.887	48.842
Central Square, N. Y.	L. S. 121.	138.372	453.975	Near Cohoes, N. Y.	N. Y. 16.	18.174	59.635
Near Caughdenoy, N. Y.	L. S. 122.	116.047	380.731	Do.	N. Y. 17.	21.224	69.632
Pennellville, N. Y.	L. S. 123.	125.721	412.470	Do.	N. Y. 18.	24.156	79.285
Near Fulton, N. Y.	L. S. 124.	121.872	399.842	Do.	N. Y. 19.	27.291	89.537
Fulton, N. Y.	L. S. 125.	106.054	347.945	Do.	N. Y. 20.	30.382	99.678
Do.	L. S. 126.	100.287	329.033	Do.	N. Y. 21.	33.414	109.626
Do.	L. S. 127.	98.291	323.165	Do.	N. Y. 22.	36.391	119.639
Do.	L. S. 128.	95.100	312.007	Do.	N. Y. 23.	39.542	129.731
Near Fulton, N. Y.	L. S. 129.	97.592	320.183	Do.	N. Y. 24.	42.560	139.632
Do.	L. S. 130.	91.815	301.230	Cohoes, N. Y.	N. Y. 25.	45.591	149.576
Minetto, N. Y.	L. S. 131.	88.889	291.630	Do.	N. Y. 27.	48.680	159.711
Near Minetto, N. Y.	L. S. 132.	87.378	286.673	Do.	N. Y. 28.	51.710	169.652
Near Oswego, N. Y.	L. S. 133.	82.775	271.571	Do.	N. Y. 29.	54.801	179.793
Do.	L. S. 134.	83.734	274.717	Near Cohoes, N. Y.	N. Y. 31.	58.014	190.334
Do.	L. S. 135.	78.903	258.868	Do.	N. Y. 32.	58.550	192.093
Oswego, N. Y.	L. S. 136.	77.716	254.973	Crescent, N. Y.	N. Y. 37.	59.292	194.527
Do.	L. S. 137.	80.031	262.568	Near Crescent, N. Y.	N. Y. 38.	58.359	191.466
Do.	L. S. 138.	76.728	251.732	Do.	N. Y. 41.	58.282	191.214
Do.	A.	76.779	251.999	Near Vischers Ferry, N. Y.	N. Y. 43.	58.386	192.211
Do.	B.	76.835	252.411	Do.	N. Y. 44.	58.594	192.237
Do.	C.	79.851	261.978	Do.	N. Y. 47.	58.832	193.018
Near Bath, N. Y.	D. W. Bath.	6.226	20.426	Vischers Ferry, N. Y.	N. Y. 48.	60.344	198.504
West Troy, N. Y.	N. Y. 12.	6.449	21.158	Near Vischers Ferry, N. Y.	N. Y. 50.	63.524	208.412
Near Troy, N. Y.	D. W. Troy 3.	5.560	18.241	Fondas Basin, N. Y.	N. Y. 51.	64.828	212.690
Cohoes, N. Y.	D. W. Cohoes 2.	33.854	111.069	Roxford Flats, N. Y.	N. Y. 54.	70.816	232.583
Do.	D. W. Cohoes 3.	47.476	155.761	Do.	N. Y. 55.	71.938	236.017
Near Cohoes, N. Y.	N. Y. 33.	48.977	160.685	Near Roxford Flats, N. Y.	N. Y. 56.	71.881	235.830
Do.	9a(1875)	58.907	193.264	Near Schenectady, N. Y.	N. Y. 60.	71.077	233.192
Near Crescent, N. Y.	D. W. Crescent.	58.622	192.329	Schenectady, N. Y.	N. Y. 62.	71.027	233.028
Dunsbach Ferry, N. Y.	D. W. Dunsbach.	56.738	186.148	Do.	N. Y. 63.	71.487	234.571
Niskayuna, N. Y.	D. W. Niskayuna.	59.808	196.220	Do.	N. Y. 66a.	72.073	236.400
Near Vischers Ferry, N. Y.	D. W. Vischers.	60.831	199.576	Do.	N. Y. 66b.	71.650	235.072
Near Aqueduct Station, N. Y.	D. W. Aqueduct 1.	82.884	271.929	Do.	N. Y. 68.	71.407	234.274
Aqueduct Station, N. Y.	N. Y. 57.	82.450	270.505	Near Schenectady, N. Y.	N. Y. 70.	70.702	231.961
Near Aqueduct Station, N. Y.	D. W. Aqueduct 3.	80.511	264.143	Do.	N. Y. 73.	73.230	240.353
Schenectady, N. Y.	N. Y. 65.	73.257	240.344	Do.	N. Y. 74.	75.599	248.028
Do.	N. Y. 67.	71.004	232.952	Do.	N. Y. 75.	76.383	250.600
Near Rotterdam Junction, N. Y.	N. Y. 76a.	76.425	250.738	Near Rotterdam Junction, N. Y.	N. Y. 76.	75.947	249.169
Rotterdam Junction, N. Y.	D. W. Rotterdam 1.	76.776	251.889	Do.	N. Y. 77.	76.812	252.007
Near Rotterdam Junction, N. Y.	D. W. Rotterdam 2.	75.341	247.181	Do.	N. Y. 78.	76.375	250.574
Pattersonville, N. Y.	D. W. Pattersonville	82.781	271.591	Do.	N. Y. 79.	76.021	249.412
Near Amsterdam, N. Y.	D. W. Amsterdam 1.	85.527	280.600	Do.	N. Y. 80.	75.633	248.139
Amsterdam, N. Y.	D. W. Amsterdam 2.	85.049	279.032	Near Pattersonville, N. Y.	N. Y. 82.	77.991	255.875
Fort Hunter, N. Y.	N. Y. 101.	91.122	298.956	Do.	N. Y. 84.	78.990	259.163
Near Auriesville, N. Y.	N. Y. 106.	92.289	302.785	Do.	N. Y. 85a.	78.474	257.460
Fultonville, N. Y.	N. Y. 115.	91.426	299.953	Do.	N. Y. 85.	78.791	258.500
Near Downing, N. Y.	N. Y. 121.	91.373	299.780	Do.	N. Y. 86.	79.063	259.943
Do.	N. Y. 124.	90.608	297.270	Do.	N. Y. 87.	77.682	254.862
Near Sprakers, N. Y.	N. Y. 131.	92.521	303.546	Near Amsterdam, N. Y.	N. Y. 92.	82.912	272.020
Fort Plain, N. Y.	N. Y. 142a.	95.713	314.018	Near Fort Hunter, N. Y.	N. Y. 96.	86.990	282.447
Mindenville, N. Y.	N. Y. 154.	98.107	321.873	Do.	N. Y. 98.	87.555	287.253
Near Indian Castle, N. Y.	N. Y. 160.	100.207	328.762	Do.	N. Y. 99.	88.532	290.439
Little Falls, N. Y.	N. Y. 173.	115.064	377.606	Fort Hunter, N. Y.	N. Y. 100.	90.801	297.908
Near Little Falls, N. Y.	N. Y. 175.	115.156	377.808	Near Fort Hunter, N. Y.	N. Y. 102.	92.135	302.280
Near Herkimer, N. Y.	N. Y. 182.	117.270	384.743	Near Auriesville, N. Y.	N. Y. 104.	92.000	302.132
Herkimer, N. Y.	N. Y. 187.	118.438	388.575	Auriesville, N. Y.	N. Y. 105.	91.470	300.998
Ilion, N. Y.	D. W. Ilion.	117.830	386.581	Near Auriesville, N. Y.	N. Y. 107.	91.716	300.905
Frankfort, N. Y.	D. W. Frankfort 1.	122.465	401.787	Do.	N. Y. 111.	92.012	301.876
Near Frankfort, N. Y.	D. W. Frankfort 3.	124.498	408.457	Do.	N. Y. 113.	91.624	300.603
Near Utica, N. Y.	D. W. Utica 1.	120.987	396.938	Fultonville, N. Y.	N. Y. 116.	91.900	301.509
Near Oriskany, N. Y.	D. W. Oriskany 2.	128.500	421.587	Near Fultonville, N. Y.	N. Y. 119.	90.911	300.911
Near Rome, N. Y.	D. W. Rome 1.	130.466	428.037	Near Downing, N. Y.	N. Y. 122.	91.317	299.596
Rome, N. Y.	D. W. Rome 2.	131.610	431.790	Do.	N. Y. 123.	90.594	297.224
Do.	D. W. Rome 3.	131.901	432.745	Near West Downing, N. Y.	N. Y. 126.	91.318	299.599
Near Rome, N. Y.	D. W. Rome 4.	128.290	420.898	Near Sprakers, N. Y.	N. Y. 130.	93.320	306.167
New London, N. Y.	D. W. New London.	124.432	408.241	Do.	N. Y. 132.	92.872	304.698
Near Sylvan Beach, N. Y.	D. W. Sylvan Beach 1.	116.286	381.515	Do.	N. Y. 133.	92.574	303.720
Do.	D. W. Sylvan Beach 2.	113.952	373.858	Near Canajoharie, N. Y.	N. Y. 134.	92.853	304.635
Near North Bay, N. Y.	D. W. North Bay.	128.617	421.971	Do.	N. Y. 137.	93.693	307.391
Brewerton, N. Y.	D. W. Brewerton.	113.698	373.024	Do.	N. Y. 138.	93.329	306.197
Near Caughdenoy, N. Y.	D. W. High Banks.	112.014	367.499	Near Fort Plain, N. Y.	N. Y. 139.	93.143	305.587
On Sand Ridge, N. Y.	D. W. Sand Ridge.	117.128	384.277	Do.	N. Y. 143.	95.237	312.457
Near Ingalls Crossing, N. Y.	D. W. Ingalls 1.	114.724	376.390	Do.	N. Y. 145.	93.752	307.585
Do.	D. W. Ingalls 2.	114.571	375.888	Do.	N. Y. 146.	94.650	310.531
Phoenix, N. Y.	D. W. Phoenix.	109.135	358.054	Near St. Johnsville, N. Y.	N. Y. 147.	94.395	309.934
Hinmanville, N. Y.	D. W. Hinmanville 1.	109.936	360.682	Do.	N. Y. 149.	95.494	313.300
Near Hinmanville, N. Y.	D. W. Hinmanville 2.	107.753	353.520	Do.	N. Y. 150.	96.813	317.627
Near Fulton, N. Y.	D. W. Fulton 2.	95.104	312.020	Do.	N. Y. 152.	97.343	319.366
Albany, N. Y.	N. Y. 1.	3.913	12.838	St. Johnsville, N. Y.	N. Y. 153.	97.754	320.715
Do.	N. Y. 2.	5.623	18.448	Near Mindenville, N. Y.	N. Y. 156.	99.287	325.744
Do.	N. Y. 4.	3.086	10.125	Do.	N. Y. 157.	99.851	327.994
Near Albany, N. Y.	N. Y. 5a.	7.625	25.016	Do.	N. Y. 159.	99.917	327.811
Watervliet, N. Y.	N. Y. 8.	9.800	32.152	Near Indian Castle, N. Y.	N. Y. 161.	99.617	326.827
Do.	N. Y. 9.	7.976	26.162	Do.	N. Y. 162.	99.546	326.594
Do.	N. Y. 10.	8.852	29.042	Do.	N. Y. 163.	101.745	333.808
Do.	N. Y. 11.	8.890	29.160	Do.	N. Y. 165.	102.418	336.016
Near Little Falls, N. Y.	N. Y. 174.	114.973	377.977	Do.	N. Y. 166.	102.440	336.190
Do.	N. Y. 176.	115.329	378.975	Do.	N. Y. 167.	103.192	338.556
Do.	N. Y. 178.	116.121	380.974	Near Little Falls, N. Y.	N. Y. 174.	114.973	377.977
Near Herkimer, N. Y.	N. Y. 180.	117.435	385.285	Do.	N. Y. 176.	115.329	378.975

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Herkimer, N. Y.	N. Y. 181	117.349	385.003	Near Syracuse, N. Y.	N. Y. 310	124.168	407.375
Do.	N. Y. 184	119.884	393.319	Do.	N. Y. 311	121.262	397.840
Near Mohawk, N. Y.	N. Y. 188	119.577	392.312	Do.	N. Y. 312	125.155	410.613
Mohawk, N. Y.	N. Y. 190	119.752	392.886	Near Belle Isle, N. Y.	N. Y. 313	126.784	415.957
Do.	N. Y. 192	123.875	406.413	Belle Isle, N. Y.	N. Y. 314	126.774	415.924
Do.	N. Y. 194	125.055	410.285	Near Amboy, N. Y.	N. Y. 315	124.035	406.938
Ilion, N. Y.	N. Y. 196	124.544	408.608	Do.	N. Y. 316	126.695	415.865
Do.	N. Y. 198	125.065	410.317	Do.	N. Y. 317	125.171	410.665
Near Ilion, N. Y.	N. Y. 199	124.730	409.218	Near Camillus, N. Y.	N. Y. 318	123.216	404.251
Do.	N. Y. 201	128.119	420.337	Do.	N. Y. 319	126.969	416.564
Near Frankfort, N. Y.	N. Y. 202	128.774	422.486	Near Warners, N. Y.	N. Y. 320	126.972	416.574
Do.	N. Y. 205	131.205	430.462	Warners, N. Y.	N. Y. 321—U. S. G. S.	125.756	412.584
Do.	N. Y. 206	131.313	430.816	Near Memphis, N. Y.	N. Y. 322	126.953	416.512
Frankfort, N. Y.	N. Y. 207	130.895	429.445	Do.	N. Y. 323	123.797	406.157
Near Frankfort, N. Y.	N. Y. 208	131.419	431.164	Do.	N. Y. 324	126.079	413.644
Do.	N. Y. 209	131.361	430.974	Do.	N. Y. 325	126.369	414.596
Near Utica, N. Y.	N. Y. 210	131.086	430.071	Near Jordan, N. Y.	N. Y. 326	125.431	411.518
Do.	N. Y. 211	130.932	429.566	Do.	N. Y. 327	125.509	411.774
Do.	N. Y. 212	130.618	428.536	Jordan, N. Y.	N. Y. 328	126.193	414.018
Do.	N. Y. 213	131.382	431.042	Do.	N. Y. 329	126.276	414.290
Do.	N. Y. 214	130.995	429.773	Do.	N. Y. 330	125.924	413.136
Do.	N. Y. 216	131.109	430.147	Do.	N. Y. 331	125.927	413.145
Utica, N. Y.	N. Y. 218	129.877	426.105	Near Jordan, N. Y.	N. Y. 332	125.159	410.626
Do.	N. Y. 224	132.322	434.126	Do.	N. Y. 333	123.964	406.705
Near Utica, N. Y.	N. Y. 226	132.771	435.000	Near Weedsport, N. Y.	N. Y. 334	124.648	408.949
Near Whitesboro, N. Y.	N. Y. 227	132.137	433.519	Do.	N. Y. 335	123.801	406.170
Near Oriskany, N. Y.	N. Y. 231	132.936	436.141	Do.	N. Y. 336	124.397	408.126
Do.	N. Y. 234	132.602	435.045	Do.	N. Y. 337	124.320	407.873
Do.	N. Y. 235	132.569	434.937	Do.	N. Y. 338	124.058	407.014
Do.	N. Y. 236	132.916	436.075	Do.	N. Y. 339	124.335	407.922
Rome, N. Y.	N. Y. 238	131.829	432.509	Do.	N. Y. 340	123.244	404.343
Near Rome, N. Y.	N. Y. 240	132.562	434.914	Weedsport, N. Y.	N. Y. 341	124.096	407.138
Near New London, N. Y.	N. Y. 242	131.885	432.693	Do.	N. Y. 342	124.397	408.126
Do.	N. Y. 244	130.909	429.491	Near Weedsport, N. Y.	N. Y. 343	124.361	408.008
Near Stacys Basin, N. Y.	N. Y. 246	132.717	435.422	Do.	N. Y. 344	123.388	404.815
Higginsville, N. Y.	N. Y. 248	132.289	434.018	Near Port Byron, N. Y.	N. Y. 345	124.819	409.510
Do.	N. Y. 249	130.476	428.070	Port Byron, N. Y.	N. Y. 346	122.754	402.735
Near Higginsville, N. Y.	N. Y. 250	131.641	431.892	Do.	N. Y. 347	124.568	408.687
Do.	N. Y. 251	130.583	428.421	Do.	N. Y. 348	124.206	407.499
Do.	N. Y. 252	130.606	428.497	Do.	N. Y. 349	123.212	404.238
Do.	N. Y. 253	131.829	432.509	Do.	N. Y. 350—U. S. G. S.	124.218	407.539
Do.	N. Y. 254	131.850	432.578	Do.	N. Y. 351—U. S. G. S.	123.938	406.620
Do.	N. Y. 255	130.482	428.089	Do.	N. Y. 352—U. S. G. S.	122.920	403.280
Near Durhamville, N. Y.	N. Y. 256	130.609	428.506	Near Port Byron, N. Y.	N. Y. 353	120.639	395.796
Durhamville, N. Y.	N. Y. 257	129.149	423.716	Near Montezuma, N. Y.	N. Y. 354	120.808	396.351
Do.	N. Y. 258	131.855	432.594	Do.	N. Y. 355	121.121	397.378
Do.	N. Y. 259	131.490	431.397	Do.	N. Y. 356	120.813	396.367
Do.	N. Y. 260	132.001	433.073	Montezuma, N. Y.	N. Y. 357	121.134	397.420
Near Durhamville, N. Y.	N. Y. 261	132.324	434.133	Do.	N. Y. 358	121.056	397.165
Do.	N. Y. 262	131.116	430.170	Do.	N. Y. 359	120.979	396.912
Near Canastota, N. Y.	N. Y. 263	131.674	432.000	Do.	N. Y. 360	121.068	397.204
Do.	N. Y. 264	130.466	428.037	Do.	N. Y. 361	121.017	397.037
Canastota, N. Y.	N. Y. 265	131.755	432.266	Near Montezuma, N. Y.	N. Y. 362	120.976	396.902
Do.	N. Y. 266	131.172	430.353	Do.	N. Y. 363—U. S. G. S.	120.897	396.643
Do.	N. Y. 267	131.979	433.001	Do.	N. Y. 364	119.423	391.807
Do.	N. Y. 268	130.826	429.218	Do.	N. Y. 365	120.035	393.815
Near Canastota, N. Y.	N. Y. 269	131.970	432.972	Do.	N. Y. 366	120.730	396.095
Do.	N. Y. 270	132.047	433.224	Near Meadville, N. Y.	N. Y. 367	118.725	389.517
Do.	N. Y. 271	130.697	428.795	Do.	N. Y. 368	118.590	389.074
Do.	N. Y. 272	132.076	433.319	Do.	N. Y. 369	121.041	397.115
Near Canaseraga, N. Y.	N. Y. 273	130.447	427.975	Do.	N. Y. 370	118.246	387.945
Do.	N. Y. 274	132.108	433.424	Do.	N. Y. 371	118.583	389.051
Near Chittenango, N. Y.	N. Y. 275	131.800	432.414	Near Clyde, N. Y.	N. Y. 372	118.860	389.960
Chittenango, N. Y.	N. Y. 276	131.894	432.722	Do.	N. Y. 373	121.104	397.322
Near Chittenango, N. Y.	N. Y. 277	130.504	428.162	Do.	N. Y. 374	120.589	395.632
Do.	N. Y. 278	132.284	434.002	Do.	N. Y. 375	118.728	389.527
Do.	N. Y. 279	132.673	435.278	Clyde, N. Y.	N. Y. 376	121.586	398.903
Near Kirkville, N. Y.	N. Y. 280	132.586	434.993	Do.	N. Y. 377	121.696	399.264
Do.	N. Y. 281	132.734	435.478	Near Clyde, N. Y.	N. Y. 378	122.322	401.318
Near Manlius, N. Y.	N. Y. 282	129.876	426.102	Do.	N. Y. 379	122.418	401.633
Do.	N. Y. 283	128.190	420.570	Near Lock Berlin, N. Y.	N. Y. 380	122.616	402.283
Manlius, N. Y.	N. Y. 284	132.036	433.188	Do.	N. Y. 381	120.103	394.038
Near Dewitt, N. Y.	N. Y. 285	132.508	434.737	Lock Berlin, N. Y.	N. Y. 382	122.261	401.118
Do.	N. Y. 286	132.347	434.208	Do.	N. Y. 383	123.920	406.561
Do.	N. Y. 287	132.720	435.432	Near Lock Berlin, N. Y.	N. Y. 384	124.654	408.969
Do.	N. Y. 288	130.590	428.444	Do.	N. Y. 385	124.917	409.832
Do.	N. Y. 289	132.268	433.949	Do.	N. Y. 386	124.690	409.087
Near Syracuse, N. Y.	N. Y. 290	132.144	433.542	Near Lyons, N. Y.	N. Y. 387	124.650	408.956
Do.	N. Y. 291	131.585	431.708	Do.	N. Y. 388	124.629	408.887
Do.	N. Y. 292	131.091	430.088	Do.	N. Y. 389	124.775	409.694
Syracuse, N. Y.	N. Y. 293	131.252	430.616	Lyons, N. Y.	N. Y. 390	124.873	409.359
Do.	N. Y. 294	128.021	420.016	Do.	N. Y. 391	124.276	407.729
Do.	N. Y. 295	125.793	412.706	Do.	N. Y. 392	125.714	412.447
Do.	N. Y. 296	125.471	411.649	Do.	N. Y. 393	125.828	412.821
Do.	N. Y. 297	124.882	409.717	Near Lyons, N. Y.	N. Y. 394	126.772	415.918
Do.	N. Y. 298	124.501	408.467	Do.	N. Y. 395	127.046	416.817
Do.	N. Y. 299	123.474	405.098	Do.	N. Y. 396	128.857	422.758
Do.	N. Y. 300	122.804	402.899	Do.	N. Y. 397	129.591	425.166
Do.	N. Y. 301	123.237	404.320	Do.	N. Y. 398	127.113	417.037
Do.	N. Y. 302	123.934	406.607	Near Newark, N. Y.	N. Y. 399	129.513	424.911
Do.	N. Y. 303	123.520	405.249	Do.	N. Y. 400	127.370	417.880
Do.	N. Y. 304	123.614	405.557	Newark, N. Y.	N. Y. 401	131.140	430.248
Do.	N. Y. 305—U. S. G. S.	123.819	406.230	Do.	N. Y. 402	133.671	438.552
Do.	N. Y. 306	123.042	403.680	Do.	N. Y. 403	136.078	446.449
Do.	N. Y. 307	123.960	406.692	Do.	N. Y. 404	136.482	447.775
Near Syracuse, N. Y.	N. Y. 308	123.154	404.048	Do.	U. S. G. S.	139.468	457.571
Do.	N. Y. 309	124.309	407.837	Do.	N. Y. 405	135.861	445.737

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Newark, N. Y.	N. Y. 406.	136.901	449.458	Medina, N. Y.	N. Y. 500.	157.235	515.862
Do	N. Y. 407.	136.786	448.772	Do	N. Y. 501.	156.584	513.726
Near Port Gibson, N. Y.	N. Y. 408.	136.786	448.772	Do	N. Y. 502.	157.094	515.259
Do	N. Y. 409.	136.901	449.156	Do	N. Y. 503=U. S. G. S.	157.640	517.191
Port Gibson, N. Y.	N. Y. 410.	136.870	449.048	Near Medina, N. Y.	N. Y. 504.	156.766	514.323
Near Palmyra, N. Y.	N. Y. 411.	137.029	449.569	Do	N. Y. 505.	155.923	511.557
Palmyra, N. Y.	N. Y. 412.	136.837	448.939	Do	N. Y. 506.	157.350	516.258
Do	N. Y. 413.	137.526	451.200	Do	N. Y. 507.	157.839	517.843
Do	N. Y. 414.	136.383	447.450	Near Middleport, N. Y.	N. Y. 508.	157.823	517.791
Do	N. Y. 415.	136.722	448.562	Do	N. Y. 509.	155.927	511.570
Near Palmyra, N. Y.	N. Y. 416.	136.126	446.607	Middleport, N. Y.	N. Y. 510.	157.165	515.632
Do	U. S. G. S.	136.132	446.626	Near Middleport, N. Y.	N. Y. 511.	155.084	508.805
Do	N. Y. 417.	137.159	449.996	Do	N. Y. 512.	157.464	516.613
Near Macedon, N. Y.	N. Y. 418.	137.188	450.091	Do	N. Y. 513.	157.513	516.774
Macedon, N. Y.	N. Y. 419.	139.082	456.305	Near Gasport, N. Y.	N. Y. 514.	157.372	516.311
Do	N. Y. 420.	141.257	463.441	Gasport, N. Y.	N. Y. 515.	155.580	510.432
Near Macedon, N. Y.	N. Y. 421.	141.964	465.700	Do	N. Y. 516.	155.275	509.431
Wayneport, N. Y.	N. Y. 422.	142.146	466.357	Near Gasport, N. Y.	N. Y. 517.	157.310	516.108
Near Fairport, N. Y.	N. Y. 423.	142.482	467.400	Do	N. Y. 518.	155.085	508.644
Do	N. Y. 424.	140.677	461.538	Do	N. Y. 519.	154.500	506.889
Do	N. Y. 425.	142.492	467.492	Do	N. Y. 520.	158.712	520.708
Fairport, N. Y.	N. Y. 426.	142.112	466.246	Near Lockport, N. Y.	N. Y. 521.	158.658	520.530
Near Fairport, N. Y.	N. Y. 427.	142.024	465.957	Do	N. Y. 522.	158.859	521.190
Do	N. Y. 428.	138.990	456.003	Lockport, N. Y.	N. Y. 523.	156.345	512.942
Do	N. Y. 429.	141.611	464.602	Do	N. Y. 524.	157.135	515.534
Do	N. Y. 430.	142.020	465.944	Do	N. Y. 525.	157.404	516.416
Near Bushnell Basin, N. Y.	N. Y. 431.	141.617	464.622	Do	N. Y. 526.	158.138	518.824
Do	N. Y. 432=U. S. G. S.	141.964	465.760	Do	N. Y. 527.	173.904	570.550
Do	N. Y. 433.	141.563	464.445	Near Lockport, N. Y.	N. Y. 528.	175.252	574.973
Near Pittsford, N. Y.	N. Y. 434.	141.992	465.852	Do	N. Y. 529.	176.008	577.453
Pittsford, N. Y.	N. Y. 435.	142.168	466.430	Do	N. Y. 530.	175.200	574.802
Do	N. Y. 436.	142.167	466.426	Near Pendleton, N. Y.	N. Y. 531.	177.194	581.344
Near Pittsford, N. Y.	N. Y. 437.	142.121	466.275	Pendleton, N. Y.	N. Y. 532.	175.340	575.261
Do	N. Y. 438.	138.527	454.484	Near Pendleton, N. Y.	N. Y. 533.	175.556	575.970
Do	N. Y. 439.	137.485	451.005	Do	N. Y. 534.	175.704	576.456
Do	N. Y. 440.	142.064	466.088	Do	N. Y. 535.	175.997	577.417
Do	N. Y. 441.	143.966	472.328	Do	N. Y. 536.	175.347	575.284
Near Brighton, N. Y.	N. Y. 442.	144.602	474.415	Near Tonawanda, N. Y.	N. Y. 537.	175.457	575.645
Do	N. Y. 443.	145.076	475.970	Tonawanda, N. Y.	N. Y. 538.	176.484	579.015
Do	N. Y. 444.	145.052	475.891	Do	N. Y. 540.	176.368	578.634
Do	N. Y. 445.	145.031	475.823	Near Tonawanda, N. Y.	N. Y. 541.	176.318	578.470
Brighton, N. Y.	N. Y. 446.	146.691	481.269	Do	N. Y. 542.	176.330	578.509
Do	N. Y. 447.	149.737	491.262	Do	N. Y. 543*	175.618	576.173
Near Rochester, N. Y.	N. Y. 448.	152.825	501.393	Do	N. Y. 544.	175.940	577.230
Rochester, N. Y.	N. Y. 449.	153.867	504.812	Near Buffalo, N. Y.	N. Y. 545.	176.203	578.093
Do	N. Y. 450.	155.665	510.711	Do	N. Y. 546.	176.624	579.474
Do	N. Y. 451.	156.551	513.618	Buffalo, N. Y.	N. Y. 548.	176.739	579.851
Do	N. Y. 452.	156.506	513.470	Do	N. Y. 549.	177.292	581.665
Do	N. Y. 453.	155.525	510.252	Do	N. Y. 550.	175.646	576.265
Do	N. Y. 454.	156.364	513.004	Do	N. Y. 551.	177.334	581.803
Do	N. Y. 455.	156.130	512.236	Do	N. Y. 552.	176.636	579.513
Do	N. Y. 456.	156.792	514.408				
Near Rochester, N. Y.	N. Y. 458.	156.514	513.496				
Do	N. Y. 459.	156.739	514.235	Phoenix, N. Y.	N. Y. 54.	111.070	364.402
Near South Greece, N. Y.	N. Y. 460.	156.655	513.959	Three River Point, N. Y.	N. Y. 55.	111.590	366.108
Do	N. Y. 461.	156.236	512.584	Belgium, N. Y.	N. Y. 56.	112.588	369.382
South Greece, N. Y.	N. Y. 462.	156.402	513.129	Near Belgium, N. Y.	N. Y. 57.	111.148	364.658
Near South Greece, N. Y.	N. Y. 463.	156.823	514.510	Do	N. Y. 58.	112.631	369.524
Near Spencerport, N. Y.	N. Y. 464.	156.449	513.283	Near Baldwinville, N. Y.	N. Y. 59.	112.548	369.251
Do	N. Y. 465.	156.501	513.454	Do	N. Y. 60.	111.580	366.075
Spencerport, N. Y.	N. Y. 466.	156.576	513.700	Do	N. Y. 61.	111.838	366.922
Do	N. Y. 467=U. S. G. S.	156.896	514.750	Do	N. Y. 62.	111.953	367.299
Near Spencerport, N. Y.	N. Y. 468.	156.480	513.385	Do	N. Y. 63.	112.332	368.543
Do	N. Y. 469.	156.761	514.307	Do	N. Y. 64.	114.003	374.025
Do	N. Y. 470.	156.635	513.893	Do	N. Y. 65.	114.703	376.321
Near Brockport, N. Y.	N. Y. 471.	157.104	515.432	Do	N. Y. 66.	115.364	378.490
Do	N. Y. 472.	155.229	509.280	Do	N. Y. 67.	119.801	393.047
Do	N. Y. 473.	156.338	512.919	Do	N. Y. 68.	114.695	376.295
Do	N. Y. 474.	156.830	514.533	Do	N. Y. 69.	114.946	377.119
Brockport, N. Y.	N. Y. 475=U. S. G. S.	155.964	511.692	Near Plainville, N. Y.	N. Y. 70.	116.010	380.609
Do	N. Y. 476.	156.516	513.503	Do	N. Y. 71.	115.321	378.349
Do	N. Y. 477.	156.046	511.961	Do	N. Y. 72.	119.728	392.808
Near Brockport, N. Y.	N. Y. 478.	157.223	515.822	Do	N. Y. 73.	118.920	390.157
Near Holley, N. Y.	N. Y. 479.	155.959	511.675	Do	N. Y. 74.	115.828	380.012
Do	N. Y. 480.	157.434	516.515	Do	N. Y. 75.	116.350	381.725
Holley, N. Y.	N. Y. 481.	157.173	515.658	Near Weedsport, N. Y.	N. Y. 76.	114.572	375.892
Near Holley, N. Y.	N. Y. 482.	157.344	516.219	Do	N. Y. 77.	117.008	383.884
Hulberton, N. Y.	N. Y. 483.	157.275	515.993	Do	N. Y. 78.	116.540	382.348
Near Hulberton, N. Y.	N. Y. 484.	157.067	515.311	Do	N. Y. 80.	116.479	382.148
Do	N. Y. 485.	157.484	516.679	Near Port Byron, N. Y.	N. Y. 81.	115.354	378.457
Near Albion, N. Y.	N. Y. 486.	157.568	516.954	Do	N. Y. 82.	117.378	383.099
Do	N. Y. 487.	157.112	515.458	Do	N. Y. 83.	117.445	385.317
Albion, N. Y.	N. Y. 488.	156.530	513.549	Do	N. Y. 84.	115.682	379.533
Near Albion, N. Y.	N. Y. 489.	157.427	516.492	Fox Ridge, N. Y.	N. Y. 85.	117.880	386.745
Do	N. Y. 490.	156.882	514.704	Near Fox Ridge, N. Y.	N. Y. 86.	118.544	388.923
Eagle Harbor, N. Y.	N. Y. 491.	157.188	515.708	Near Savannah, N. Y.	N. Y. 87.	123.530	405.281
Do	N. Y. 492=U. S. G. S.	157.190	515.714	Do	N. Y. 88.	119.765	392.929
Near Eagle Harbor, N. Y.	N. Y. 493.	157.541	516.866	Do	N. Y. 89.	118.442	388.588
Near Knowlesville, N. Y.	N. Y. 494.	157.183	515.691	Near Clyde, N. Y.	N. Y. 90.	121.990	395.945
Do	N. Y. 495.	155.638	510.622				
Do	N. Y. 496.	157.468	516.626				
Do	N. Y. 497.	156.549	513.611	Syracuse, N. Y.	N. Y. 1.	123.997	406.813
Near Medina, N. Y.	N. Y. 498.	157.022	515.163	Do	N. Y. 2.	123.453	403.029
Do	N. Y. 499.	157.418	516.462	Do	N. Y. 3.	123.179	404.130

* This bench mark may be identical with D. W. Cherry (see page 99). If found to be the same the mean of the two elevations should be used.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Syracuse, N. Y.	N. Y. 4.	122.835	403.001	Whites Station, Quebec	D. W. White	54.503	178.815
Do	N. Y. 5.	119.475	391.978	Ste. Agnes, Quebec	D. W. Ste. Agnes	60.230	197.605
Do	N. Y. 6.	116.067	380.796	Fort Covington, N. Y.	D. W. Fort Covington	50.735	166.453
Do	N. Y. 7.	113.782	373.300				
Do	N. Y. 8.	113.916	373.739				
Do	N. Y. 9.	113.336	371.837				
Near Liverpool, N. Y.	N. Y. 10.	111.886	365.439	St. Regis, Quebec	P. B. M. A St. Regis	51.770	169.849
Do	N. Y. 11.	113.474	372.289	Do	P. B. M. B St. Regis	50.866	166.883
Near Belgium, N. Y.	N. Y. 12.	111.288	365.117	Hogansburg, N. Y.	P. B. M. C Hogansburg	54.349	179.950
Do	N. Y. 13.	113.759	373.224	Do	P. B. M. P Hogansburg	54.334	178.261
Do	N. Y. 14.	113.093	371.039				
				Near Racket River, N. Y.	P. B. M. 1.	52.390	171.883
Waterford, N. Y.	D. W. Waterford 1.	9.048	29.685	Near Grass River, N. Y.	P. B. M. 2.	63.393	207.982
Do	N. Y. 6.	10.861	35.633	On River Road, N. Y.	P. B. M. 3.	62.294	204.376
Near Waterford, N. Y.	N. Y. 13.	15.902	52.172	Do	P. B. M. 4.	67.476	221.377
Mechanicsville, N. Y.	D. W. Mechanicsville 1.	18.636	61.142	Do	P. B. M. 5.	75.395	247.358
Do	D. W. Mechanicsville 2.	17.036	55.892	Richards Landing, N. Y.	P. B. M. 6.	70.830	232.381
Do	N. Y. 20.	26.937	88.376	Louisville Landing, N. Y.	P. B. M. Louisville Landing	70.107	230.009
Do	N. Y. 21.	26.993	88.560				
Do	D. W. Mechanicsville 5.	28.083	92.136	Near Louisville Landing, N. Y.	P. B. M. 7.	68.340	224.212
Near Mechanicsville N. Y.	N. Y. 25.	30.225	99.155	Bradford's Hill, N. Y.	P. B. M. 8.	79.070	259.415
Stillwater, N. Y.	N. Y. 30.	27.142	89.048	Near Egg Island, N. Y.	P. B. M. 9.	72.794	238.825
Between Stillwater and Schaghticoke, N. Y.	D. W. Stillwater 2.	30.436	99.855	Near Murphys Island, N. Y.	P. B. M. 10.	72.013	236.263
Bemis Heights, N. Y.	N. Y. 35.	31.468	103.241	Waddington, N. Y.	P. B. M. 11.	84.857	278.402
Near Bemis Heights, N. Y.	N. Y. 38.	32.023	105.062	Do	P. B. M. A Waddington	83.175	272.883
Wilburs Basin, N. Y.	D. W. Wilburs Basin.	31.108	102.060	Do	P. B. M. B Waddington	84.145	276.066
Between Wilburs Basin and Coveville, N. Y.	U. S. G. S.	31.454	103.195				
Coveville, N. Y.	N. Y. 50.	32.247	105.797	Near Waddells Point, N. Y.	P. B. M. 12.	77.205	253.297
Schuylerville, N. Y.	N. Y. 55.	32.280	105.905	Tilden, N. Y.	P. B. M. 13A.	83.340	273.425
Do	N. Y. 57.	31.807	104.353	Do	P. B. M. 13.	82.282	269.954
Northumberland, N. Y.	N. Y. 60.	33.254	109.101	Near Lisbon, N. Y.	P. B. M. 14.	83.371	273.526
Fort Miller, N. Y.	N. Y. 67.	37.559	123.225	Lisbon, N. Y.	P. B. M. 15.	84.955	278.723
Moses Kill, N. Y.	N. Y. 76.	43.250	141.896	Near Ogdensburg, N. Y.	P. B. M. 16.	86.024	282.230
Near Fort Edward, N. Y.	N. Y. 82.	43.272	141.968	Ogdensburg, N. Y.	P. B. M. A Ogdensburg	84.703	277.896
Fort Edward, N. Y.	U. S. G. S.	44.065	144.570	Do	P. B. M. B Ogdensburg	85.571	280.744
Dunhams Basin, N. Y.	N. Y. 95.	44.406	145.689	Do	P. B. M. C Ogdensburg	88.355	289.878
Smiths Basin, N. Y.	N. Y. 101.	43.147	141.558	Do	P. B. M. D Ogdensburg	76.512	251.023
Fort Ann, N. Y.	N. Y. 112.	42.480	139.370	Near Ogdensburg, N. Y.	P. B. M. 17.	79.064	259.396
Near Comstock, N. Y.	N. Y. 115.	39.954	131.082	Do	P. B. M. 18.	75.910	249.048
Between Comstock and Whitehall, N. Y.	N. Y. 120.	40.743	133.671	Near Morristown, N. Y.	P. B. M. 19.	76.001	249.347
Whitehall, N. Y.	D. W. Whitehall 1.	37.400	122.703	Morristown, N. Y.	P. B. M. A Morristown	83.116	272.690
Do	U. S. C. S. 38.	31.566	103.563	Do	P. B. M. B Morristown	82.689	271.289
				Do	P. B. M. C Morristown	78.638	257.998
Near Whitehall, N. Y.	U. S. B. M.	32.657	107.142	Near Morristown, N. Y.	P. B. M. 20.	74.837	245.528
Near Snody Dock, N. Y.	D. W. Snody	32.212	105.682	Do	P. B. M. 21.	104.557	343.034
Chubbs Dock, N. Y.	D. W. Chubb	32.395	106.283	Near Oak Point Village, N. Y.	P. B. M. 22.	103.398	339.232
Near Dresden, N. Y.	D. W. Dresden	32.611	106.991	Do	P. B. M. Oak Point	103.153	338.428
Putnam, N. Y.	U. S. C. S. 39.	32.501	106.630	Do	P. B. M. 23.	79.258	260.032
Do	D. W. Putnam 2.	32.083	105.259	Near Chippewa Village, N. Y.	P. B. M. 23A.	79.063	259.393
Wrights, N. Y.	D. W. Wrights	32.405	106.628	Chippewa Village, N. Y.	P. B. M. Chippewa Village	88.605	290.698
Fort Ticonderoga, N. Y.	D. W. Ticonderoga	33.092	108.569	Near Chippewa Village, N. Y.	P. B. M. 24.	88.494	290.334
Ticonderoga, N. Y.	U. S. G. S.	33.335	109.367	Do	P. B. M. 25.	111.905	367.142
Between Addison Junction and Crown Point, N. Y.	D. W. Five Mile Point.	32.576	106.876	Near Alexandria Bay, N. Y.	P. B. M. 26.	101.724	333.739
Near Crown Point, N. Y.	D. W. Crown Point	34.566	113.405	Do	P. B. M. 27.	83.373	273.533
Fort Frederick, N. Y.	Crown Point North Base.	49.117	161.145	Alexandria Bay, N. Y.	P. B. M. A Alexandria Bay	78.993	259.163
Crown Point Lighthouse, N. Y.	L. H.	39.570	129.823	Do	P. B. M. B Alexandria Bay	86.637	284.242
				Near Alexandria Bay, N. Y.	P. B. M. 28.	88.063	288.920
Near Coopersville, N. Y.	D. W. Coopersville	31.102	102.040	Do	P. B. M. 29.	83.622	274.350
Do	D. W. Leggets Crossing.	40.459	132.739	Near Clayton, N. Y.	P. B. M. 30.	80.533	264.215
Rouses Point, N. Y.	Rouse Point 1882.	32.903	107.949	Clayton, N. Y.	P. B. M. A Clayton	84.983	278.815
Fort Montgomery, N. Y.	U. S. E.	28.651	93.999	Do	P. B. M. B Clayton	80.582	264.376
Near Champlain, N. Y.	D. W. Champlain 1.	40.185	131.840	Do	P. B. M. C Clayton	79.440	260.629
Champlain, N. Y.	D. W. Champlain 2.	33.072	108.504	Near Clayton, N. Y.	P. B. M. 31.	111.153	364.674
Near Champlain, N. Y.	D. W. Champlain 3.	49.981	163.979	Do	P. B. M. 32.	83.171	272.870
Do	D. W. Champlain 4.	51.858	170.137	Near Dodge Bay, N. Y.	P. B. M. 33.	79.187	259.799
Do	D. W. Champlain 5.	60.231	197.608	Near Cape Vincent, N. Y.	P. B. M. 34.	79.337	260.291
Near Barrington, Quebec.	D. W. Barrington 1.	63.349	207.837	Cape Vincent, N. Y.	P. B. M. A Cape Vincent	77.464	254.146
Barrington, Quebec.	D. W. Barrington 2.	57.402	188.326	Do	P. B. M. B Cape Vincent	79.087	259.471
Near Barrington, Quebec.	D. W. Barrington 3.	53.832	176.614	Do	P. B. M. C Cape Vincent	82.956	272.165
Near Ste. Clothilde, Quebec.	D. W. Ste. Clothilde 1.	59.971	196.755	Tibbetts Point, N. Y.	P. B. M. 35.	80.423	263.854
Do	D. W. Ste. Clothilde 2.	52.387	171.873				
Aubrey, Quebec.	D. W. Aubrey 1.	41.186	135.124				
Near Aubrey, Quebec.	D. W. Aubrey 2.	40.323	132.293				
Ormstown, Quebec.	D. W. Ormstown 1.	41.968	137.690				
Near Ormstown and St. Stanislas, Quebec.	D. W. Ormstown 2.	47.363	155.390				
Near St. Stanislas, Quebec.	D. W. Lake St. Francis.	47.679	156.427				
Valleyfield, Quebec.	D. W. Valleyfield	47.143	154.668	Near Waterford, N. Y.	N. Y. 1.	11.646	38.229
St. Stanislas, Quebec.	D. W. St. Stanislas	50.185	164.649	Do	N. Y. 2.	15.105	49.557
Huntingdon, Quebec.	D. W. Huntingdon	48.444	158.937	Do	N. Y. 3.	15.684	51.457
Carrs Crossing, Quebec.	D. W. Carr	50.928	182.736	Do	N. Y. 4.	15.910	55.479
				Waterford, N. Y.	N. Y. 5.	14.992	49.158

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Waterford, N. Y.	N. Y. 7.	16.608	54.488	Near Comstock, N. Y.	N. Y. 118.	38.418	126.043
Do.	N. Y. 8.	18.963	62.214	Do.	N. Y. 119.	38.652	126.811
Do.	N. Y. 9.	22.990	75.426	Do.	N. Y. 121.	37.564	123.241
Do.	N. Y. 10.	24.702	81.043	Near Whitehall, N. Y.	N. Y. 122.	37.808	124.042
Do.	N. Y. 11.	24.471	80.285	Do.	N. Y. 123.	37.527	123.120
Do.	N. Y. 12.	24.473	80.292	Do.	N. Y. 124.	37.760	123.884
Do.	N. Y. 14.	24.195	79.380	Do.	N. Y. 125.	38.275	125.574
Do.	N. Y. 15.	25.306	83.025	Do.	N. Y. 126.	37.397	122.693
Near Mechanicsville, N. Y.	N. Y. 16.	26.838	88.051	Do.	N. Y. 127.	37.035	121.506
Do.	N. Y. 17.	28.687	94.117	Whitehall, N. Y.	N. Y. 128.		
Do.	N. Y. 18.	29.041	95.279		N. Y. 129.		
Do.	N. Y. 19.	29.248	95.934				
Mechanicsville, N. Y.	N. Y. 22.	28.984	95.092	Dobbs Ferry, N. Y.	T.	4.229	13.875
Near Mechanicsville, N. Y.	N. Y. 23.	29.026	95.229	Do.	U.	*4.480	14.698
Do.	N. Y. 24.	28.752	94.331	Do.	W.	*2.760	9.055
Near Stillwater, N. Y.	N. Y. 26.	31.449	103.179	R. R. 36.		1.903	6.243
Do.	N. Y. 27.	31.542	103.494				
Do.	N. Y. 28.	32.169	105.541	Between Ardsley and Irvington, N. Y.	X.	3.498	11.476
Stillwater, N. Y.	N. Y. 29.	31.584	103.622	Near Tarrytown, N. Y.	Y.	2.610	8.563
Near Stillwater, N. Y.	N. Y. 31.	31.872	104.567	Do.	Y.	3.272	10.735
Near Bemis Heights, N. Y.	N. Y. 32.	31.932	104.764	Tarrytown, N. Y.	Z.	2.619	8.592
Do.	N. Y. 33.	32.314	106.017	Do.	Ai.	3.228	10.591
Do.	N. Y. 34.	32.048	105.145	Near Tarrytown, N. Y.	Id.	2.040	6.693
Bemis Heights, N. Y.	N. Y. 36.	31.544	103.491	Do.	Bi.	2.641	8.665
Near Bemis Heights, N. Y.	N. Y. 37.	31.727	104.091	Scarboro, N. Y.	Bj.	2.388	7.835
Do.	N. Y. 39.	32.143	105.456	Ossining, N. Y.	R. R. 60.	2.743	8.999
Do.	N. Y. 40.	31.200	102.362	Near Ossining, N. Y.	C.	3.122	10.243
Do.	N. Y. 41.	31.949	104.819	Near Croton, N. Y.	R. R. 67.	11.411	37.438
Do.	N. Y. 42.	32.089	105.279	Near Ossawana, N. Y.	V. O. 71.	9.093	29.833
Near Coveville, N. Y.	N. Y. 43.	31.872	104.567	Verplanck, N. Y.	V. O. 12.	4.311	14.144
Do.	N. Y. 44.	32.078	105.243	Do.	V. O. Peekskill.	3.213	10.541
Do.	N. Y. 45.	31.927	104.748	Near Peekskill, N. Y.	V. O. 11.	2.070	6.791
Do.	N. Y. 46.	32.068	105.210	Do.	R. R. 81.	2.935	9.629
Do.	N. Y. 47.	31.992	104.960	Near Highland, N. Y.	R. R. 84.	2.399	7.871
Do.	N. Y. 48.	31.646	103.825	Do.	Di.	2.401	7.877
Coveville, N. Y.	N. Y. 49.	31.294	102.670	Near Garrison, N. Y.	R. R. 97.	3.250	10.663
Near Coveville, N. Y.	N. Y. 51.	32.311	106.007	Do.	R. R. 99.	6.290	20.636
Near Schuylerville, N. Y.	N. Y. 52.	32.586	106.909	Garrison, N. Y.	V. O. 9.	4.278	14.035
Do.	N. Y. 53.	32.433	106.407	Cold Spring, N. Y.	Di.	3.974	13.038
Schuylerville, N. Y.	N. Y. 54.	32.393	106.276	Do.	Di.	3.396	11.142
Do.	N. Y. 56.	32.103	105.325	Near Fishkill, N. Y.	R. R. 118.	2.515	8.251
Near Schuylerville, N. Y.	N. Y. 58.	32.728	107.375	Fishkill, N. Y.	Fi.	1.619	5.312
Near Northumberland, N. Y.	N. Y. 59.	33.237	109.045	Near Chelsea, N. Y.	Hi.	4.435	14.550
Do.	N. Y. 61.	34.245	112.352	New Hamburg, N. Y.	Gi.	1.764	5.787
Near Fort Miller, N. Y.	N. Y. 62.	34.800	114.173	Camelot, N. Y.	Hi.	9.657	31.683
Do.	N. Y. 63.	33.986	111.502	Poughkeepsie, N. Y.	Hi.	11.780	38.648
Do.	N. Y. 64.	36.942	121.201	Do.	Ig.	13.192	43.281
Do.	N. Y. 65.	36.661	120.279	Do.	Vose.	12.176	39.947
Fort Miller, N. Y.	N. Y. 66.	37.173	121.958	Do.	Ii.	12.196	40.013
Near Fort Miller, N. Y.	N. Y. 68.	37.514	123.077	Near Poughkeepsie, N. Y.	Hi.	6.188	20.302
Do.	N. Y. 69.	40.167	131.781	Near Hyde Park, N. Y.	R. R. 77.	2.992	9.816
Do.	N. Y. 70.	40.392	132.519	Do.	Je.	2.064	6.772
Do.	N. Y. 71.	40.218	131.949	Do.	R. R. 159.	2.563	8.409
Do.	N. Y. 72.	40.391	132.516	Do.	R. R. 161.	2.275	7.464
Do.	N. Y. 73.	40.487	132.831	Hyde Park, N. Y.	R. R. 162.	2.365	8.415
Do.	N. Y. 74.	40.273	132.129	Near Hyde Park, N. Y.	R. R. 163.	1.973	6.473
Do.	N. Y. 75.	42.801	140.423	Do.	R. R. Dewitt.	7.339	24.078
Near Fort Edward, N. Y.	N. Y. 77.	42.660	139.960	Near Staatsburg, N. Y.	Iz.	1.164	3.819
Do.	N. Y. 78.	42.756	140.275	Near Rhinecliff, N. Y.	Iyyy.	3.966	13.012
Do.	N. Y. 79.	42.194	138.431	Rhinecliff, N. Y.	Iyy.	4.724	15.499
Do.	N. Y. 80.	43.230	141.830	Do.	Iy.	3.132	10.276
Do.	N. Y. 81.	43.113	141.447	Near Barrytown, N. Y.	Iv.	0.698	2.290
Do.	N. Y. 83.	42.958	140.938	Do.	It.	2.234	7.329
Do.	N. Y. 84.	42.731	140.193	Near Tivoli, N. Y.	Is.	2.361	7.746
Do.	N. Y. 85.	43.038	141.200	Do.	Ir.	2.748	9.016
Do.	N. Y. 86.	43.222	141.804	Near Germantown, N. Y.	Iq.	2.680	8.793
Do.	N. Y. 87.	43.138	141.529	Do.	Io.	3.004	9.856
Fort Edward, N. Y.	N. Y. 88.	42.652	139.934	Near Livingston Creek, N. Y.	Io.	2.426	7.959
Near Fort Edward, N. Y.	N. Y. 90.	45.270	148.523				
Do.	N. Y. 91.	45.646	149.757	Near Linlithgo, N. Y.	R. R. 213.	2.786	9.140
Do.	N. Y. 92.	45.204	148.307	Catskill Station, N. Y.	Im.	4.500	14.764
Glens Falls, N. Y.	N. Y. 93.	46.590	152.854	Do.	Ik.	2.362	7.749
Near Glens Falls, N. Y.	N. Y. 94.	45.849	150.423	Near Hudson, N. Y.	151 A.	46.190	151.542
Near Dunhams Basin, N. Y.	N. Y. 96.	45.381	148.887	Do.	City 14.	46.268	151.798
Do.	N. Y. 97.	45.042	147.775	Do.	City 29.	29.186	95.754
Do.	N. Y. 98.	45.944	150.735	Do.	Ji.	30.848	101.207
Near Smiths Basin, N. Y.	N. Y. 99.	45.902	150.597	Do.	V. O. 4.	3.257	10.686
Do.	N. Y. 100.	46.167	151.466	R. R. 223.		2.708	8.884
Smiths Basin, N. Y.	N. Y. 102.	45.691	149.905				
Near Smiths Basin, N. Y.	N. Y. 103.	45.662	149.809	Between Hudson and Stockport Station, N. Y.	D. W. Stockport 1.	2.052	6.732
Do.	N. Y. 104.	45.694	149.914	Stockport Station, N. Y.	R. R. 237.	2.066	6.778
Do.	N. Y. 105.	45.662	149.809	Near Coxsackie Station, N. Y.			
Near Fort Ann, N. Y.	N. Y. 106.	46.124	151.325	Stuyvesant, N. Y.	Id.	4.064	13.333
Do.	N. Y. 107.	45.448	149.107	Near Stuyvesant, N. Y.	D. W. Stuyvesant 3.	2.768	9.081
Do.	N. Y. 108.	46.299	151.899	Near Schodack Landing, N. Y.	Id.	1.803	5.915
Do.	N. Y. 109.	46.072	151.155	Do.	Ki.	3.272	10.735
Do.	N. Y. 110.	45.216	148.346	Near Castleton, N. Y.	D. W. Castleton 1.	4.444	14.580
Do.	N. Y. 111.	40.281	132.155	Castleton, N. Y.	Li.	5.666	18.589
Near Comstock, N. Y.	N. Y. 113.	39.109	128.310	Do.	Ib.	5.155	16.912
Do.	N. Y. 114.	38.602	126.647	Do.	Mi.	8.192	26.877
Do.	N. Y. 116.	38.141	125.134	Rensselaer, N. Y.	V. O. 1.	6.704	21.995
Do.	N. Y. 117.	38.013	124.714	Do.			

* These elevations of bench marks, established by the Coast and Geodetic Survey, were furnished by Mr. Frederick W. Koop, Assistant Engineer in Charge, Board of Estimate and Apportionment, New York City. Mr. Koop had supplemented the leveling in the vicinity of that city by many miles of precise leveling. The elevations under consideration result from an adjustment made by him.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Rensselaer, N. Y.	N1.....	5.368	17.612	Cohoes, N. Y.	Mill Race.....	48.586	159.403
Greenbush (now Rensselaer), N. Y.	Gristmill.....	4.226	13.865	Do	B. M. 8 (1875).....	48.734	159.888
Rensselaer, N. Y.	(1875).....	4.272	14.016	Erie, Pa.	B. M. 1 (1873).....	175.380	575.392
Troy, N. Y.	O1.....	8.170	26.804	Do	L. H.....	176.050	577.591
Do	D. W. Troy 2.....	7.242	23.760	Do	635 Pittsburg, 1899.....	193.908	636.180
Do	City 1.....	7.027	23.054	Do	685.....	209.068	685.917
Do	P1.....	8.285	27.182	Do	1103 Pittsburg, 1899.....	336.326	1103.429
Do	City 2.....	8.224	26.982	Near Belle Valley, Pa.	1214 Pittsburg, 1899.....	370.420	1215.286
Hudson, N. Y.	D. W. Hudson 1.....	2.209	7.247	Near Samson, Pa.	P. R. R. No. 85.....	369.429	1212.035
Near Hudson, N. Y.	D. W. Hudson 3.....	2.452	8.045	Do	P. R. R. No. 82.....	363.024	1191.021
Stockport Station, N. Y.	D. W. Stockport 2.....	3.166	10.387	Near Leboeuf, Pa.	1193 Pittsburg, 1899.....	363.996	1194.210
Near Stockport Station, N. Y.	D. W. Stockport 3.....	2.581	8.468	Near Millers, Pa.	1148 Pittsburg, 1899.....	349.983	1148.236
Near Cossack Station, N. Y.	D. W. Cossackie.....	2.063	6.768	Near Venango, Pa.	1128 Pittsburg, 1899.....	344.034	1128.718
Between Stuyvesant and Castleton, N. Y.	D. W. Stuyvesant 2.....	2.047	6.716	Near Saegertown, Pa.	1109 Pittsburg, 1899.....	338.096	1109.237
Do	D. W. Stuyvesant 4.....	2.644	8.675	Near Meadville, Pa.	1071 Pittsburg, 1899.....	326.781	1072.114
Do	D. W. Stuyvesant 5.....	3.368	11.050	Near Cochran, Pa.	1062 Pittsburg, 1899.....	323.820	1062.399
Near Castleton, N. Y.	D. W. Castleton 2.....	3.090	10.138	Utica, Pa.	1038 Pittsburg, 1899.....	316.482	1038.325
Do	D. W. Castleton 3.....	3.710	12.172	Near Sugar Creek, Pa.	1013 Pittsburg, 1899.....	308.955	1013.630
Do	D. W. Castleton 5.....	3.894	12.776	Franklin, Pa.	989 Pittsburg, 1899.....	301.554	989.348
Dunkirk, N. Y.	598 D.....	182.556	598.936	Do	987 Pittsburg, 1899.....	301.075	987.777
Do	Nelson Block.....	179.487	588.867	East Sandy, Pa.	970 Pittsburg, 1899.....	295.932	970.904
Forestville, N. Y.	871 D.....	265.752	871.888	Near Brandon, Pa.	957 Pittsburg, 1899.....	291.913	957.918
Near Smith Mills, N. Y.	1087 D.....	334.892	1098.626	Near Kennerdell, Pa.	941 Pittsburg, 1899.....	287.236	942.373
Dayton, N. Y.	1322 D.....	403.229	1322.927	Near St. George, Pa.	925 Pittsburg, 1899.....	282.301	926.182
Cattaraugus, N. Y.	1401 D.....	422.341	1385.630	Near Rockland, Pa.	919 Pittsburg, 1899.....	280.658	920.792
Little Valley, N. Y.	1593 D.....	485.927	1594.245	Near Dotter, Pa.	905 Pittsburg, 1899.....	276.187	906.123
Near Salamanca, N. Y.	1413 D.....	430.918	1413.770	Near Emmenton, Pa.	898 Pittsburg, 1899.....	274.042	899.086
Salamanca, N. Y.	1391 D.....	424.126	1391.487	Parker, Pa.	883 Pittsburg, 1899.....	269.448	884.014
Carrollton, N. Y.	1393 D.....	425.087	1394.640	Monterey, Pa.	869 Pittsburg, 1899.....	265.190	870.044
Allegany, N. Y.	1408 D.....	429.445	1408.937	Near Lower Hillville, Pa.	855 Pittsburg, 1899.....	261.027	856.386
Olean, N. Y.	1450 D.....	442.506	1451.788	East Brady, Pa.	852 Pittsburg, 1899.....	259.887	852.646
Near Hinsdale, N. Y.	1508 D.....	460.032	1509.288	Red Bank, Pa.	844 Pittsburg, 1899.....	257.479	844.746
Near Cuba, N. Y.	1515 D.....	462.318	1516.788	Near Rimertown, Pa.	820 Pittsburg, 1899.....	250.183	820.809
Friendship, N. Y.	1520 D.....	463.603	1521.004	Mosgrove, Pa.	806 Pittsburg, 1899.....	246.043	807.226
Near Belvidere, N. Y.	1351 D.....	412.165	1352.245	Kittanning, Pa.	803 Pittsburg, 1899.....	244.907	803.499
Belmont, N. Y.	1416 D.....	432.136	1417.766	Near Rosston, Pa.	786 Pittsburg, 1899.....	239.860	786.941
Wellsville, N. Y.	1519 D.....	463.453	1520.512	West Penn Junction, Pa.	788 Pittsburg, 1899.....	240.358	788.574
Near Andover, N. Y.	1573 D.....	479.819	1574.206	Do	P. R. R. No. 26.....	240.352	788.555
Do	1675 D.....	510.878	1676.105	Edgecliff, Pa.	764 Pittsburg, 1899.....	232.709	763.479
Alfred, N. Y.	1610 D.....	491.153	1611.391	Blacks Run, Pa.	770 Pittsburg, 1899.....	235.060	771.193
Almond, N. Y.	1383 D.....	421.513	1382.914	Wildwood, Pa.	P. R. R.....	228.244	748.831
Hornellsville, N. Y.	1141 D.....	348.229	1142.481	Near Brilliant, Pa.	745 Pittsburg, 1899.....	227.184	745.353
Near Canisteo, N. Y.	1113 D.....	339.576	1114.092	Penn Ave. Curb.....	224.523	736.623	
Near Adrian, N. Y.	1080 D.....	329.545	1081.182	P. R. R. No. 99.....	226.699	743.762	
Cameron, N. Y.	1048 D.....	319.710	1048.915	Do	738 Pittsburg, 1899.....	225.060	738.384
Rathbone, N. Y.	1006 D.....	306.947	1007.042	Do	P. R. R. No. 100.....	226.751	743.932
Addison, N. Y.	1021 D.....	311.675	1022.554	Near Elmira, N. Y.	1067 H.....	325.630	1068.338
Painted Post, N. Y.	935 D.....	285.353	936.196	Snedekerville, Pa.	1265 H.....	385.642	1265.227
Corning, N. Y.	City Hall.....	285.525	936.760	Near Columbia Crossroads, Pa.	1099 H.....	335.236	1099.853
Near Big Flats, N. Y.	899 D.....	274.568	900.812	Near Troy, Pa.	1139 H.....	347.399	1139.758
Horseheads, N. Y.	901 D.....	274.964	902.111	Near Cowley, Pa.	1358 H.....	414.177	1358.846
Elmira, N. Y.	857 A.....	261.710	858.627	Near Canton, Pa.	1246 H.....	379.883	1246.333
Do	Erie Station.....	260.480	854.591	Roaring Branch, Pa.	966 H.....	294.509	966.235
Wellsburg, N. Y.	824 A.....	250.913	823.204	Near Raiston, Pa.	851 H.....	259.725	852.114
Near Chemung, N. Y.	804 A.....	244.778	803.076	Near Fields, Pa.	732 H.....	223.270	732.512
Waverly, N. Y.	840 A.....	255.830	839.336	Near Powys, Pa.	620 H.....	189.145	620.553
Near Barton, N. Y.	798 A.....	243.084	797.518	Williamsport, Pa.	528 H.....	161.016	528.267
Owego, N. Y.	815 A.....	248.421	815.028	Near Red House, N. Y.	1340 D.....	408.708	1340.903
Near Owego, N. Y.	812 A.....	247.400	811.678	Near Quaker Bridge, N. Y.	1316 D.....	401.513	1317.297
Near Union, N. Y.	825 A.....	252.482	828.351	Near Wolf Run, N. Y.	Bridge 121.....	404.476	1327.018
Binghamton, N. Y.	867 A.....	263.974	866.055	Near Corydon, Pa.	1281 D.....	390.713	1281.864
Near Port Crane, N. Y.	959 A.....	292.157	958.518	Do	Bridge 758.....	387.478	1271.251
Near Sanitaria Springs, N. Y.	1125 A.....	343.089	1125.618	Near Sugar Run, Pa.	1253 D.....	382.343	1254.404
Near Tunnel, N. Y.	1384 A.....	421.845	1384.003	Sugar Run, Pa.	Bridge 113.....	379.537	1245.198
Near Harpersville, N. Y.	1051 A.....	319.748	1049.040	Kinzua, Pa.	1229 D.....	374.968	1230.207
Alton, N. Y.	973 A.....	296.504	972.780	Tuttlestown, Pa.	Bridge.....	375.533	1232.061
Near Bainbridge, N. Y.	978 A.....	297.996	977.675	Near Great Bend, Pa.	Bridge 644.....	372.238	1221.251
Do	989 A.....	301.653	989.673	Near Hemlock, Pa.	1205 D.....	367.519	1205.768
Unadilla, N. Y.	1024 A.....	311.910	1023.325	Warren, Pa.	1193 D.....	363.775	1193.485
Wells Bridge, N. Y.	1047 A.....	319.022	1046.658	Do	P. R. R. 33.....	364.180	1194.814
Near Otego, N. Y.	1051 A.....	320.085	1050.146	Jacksons Crossing, Pa.	P. R. R. 37.....	359.902	1180.778
Oneonta, N. Y.	1232 A.....	375.487	1231.910	Near Irvineton, Pa.	P. R. R. 38.....	355.450	1166.172
Do	Oneonta.....	331.156	1086.468	Do	P. R. R. 39.....	356.297	1168.951
Colliers, N. Y.	1119 A.....	340.917	1118.492	Do	1167 D.....	355.991	1167.947
Near Maryland, N. Y.	1170 A.....	356.571	1169.850	Thompson, Pa.	1135 D.....	346.290	1136.120
Schenectus, N. Y.	1272 A.....	387.520	1271.389	Tidioute, Pa.	1116 D.....	340.444	1116.940
Worcester, N. Y.	1311 A.....	399.338	1310.161	Trunkeyville, Pa.	1098 D.....	334.868	1098.646
Near East Worcester, N. Y.	1406 A.....	428.308	1405.207	Near Hickory, Pa.	1086 D.....	331.190	1086.579
Near Richmondville, N. Y.	1224 A.....	372.790	1223.062	Tionesta, Pa.	1063 D.....	324.396	1064.299
Cobleskill, N. Y.	930 A.....	283.344	929.604	Near President, Pa.	1042 D.....	317.814	1042.695
Barnerville Crossing, N. Y.	Barnerville.....	275.489	903.833	Near Oleopolis, Pa.	1030 D.....	314.352	1031.336
Near Howes Cave, N. Y.	731 A.....	222.726	730.727	Near South Oil City, Pa.	1009 P.....	307.747	1009.667
Near Esperance, N. Y.	753 A.....	229.344	752.439	Near Langdon, N. Y.	860 A.....	262.271	860.467
Near Duaneburg, N. Y.	681 A.....	207.515	680.822	Near Kirkwood, N. Y.	Signal tower.....	265.945	872.521
Near Kelleys, N. Y.	410 A.....	124.666	409.008	Great Bend, Pa.	880 A.....	268.462	880.779
Schenectady, N. Y.	242 A.....	73.516	241.194	Hickory Grove, Pa.	893 A.....	272.376	893.620
Near Schenectady, N. Y.	B. M. 15 (1875).....	66.216	217.244	Near Susquehanna, Pa.	955 A.....	271.432	895.140
Near Rexford Flats, N. Y.	B. M. 14 (1875).....	63.492	208.307				
Do	14a (1875).....	63.519	208.395				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Deposit, N. Y.	1026 A.	312.891	1026.543	Near Mount Morris, N. Y.	575 R.	174.981	574.083
Do.	978 A.	298.391	978.971	Do.	Bridge.	184.013	603.715
Near Hancock, N. Y.	924 A.	281.856	924.722	Near Sonyea, N. Y.	Bridge.	186.404	611.560
				Do.	Bridge 13.	215.670	707.577
Near Stockport, N. Y.	882 A.	260.110	882.905	Near Tuscarora, N. Y.	Bridge 15.	228.242	748.824
Lordville, N. Y.	865 A.	263.931	865.914	Do.	773 R.	233.703	773.302
Long Eddy, N. Y.	834 A.	254.568	835.195	Nunda Junction, N. Y.	Tree.	264.436	867.570
Hankins, N. Y.	801 A.	244.455	802.016	Nunda, N. Y.	944 R.	287.837	944.345
Callicoon, N. Y.	780 A.	237.953	780.684	Near Nunda, N. Y.	Culvert.	382.209	1253.964
Cochecton, N. Y.	746 A.	227.618	746.777	Near Ross Crossing, N. Y.	Culvert.	401.712	1317.950
Narrowsburg, N. Y.	718 A.	219.065	718.716	Near Swains, N. Y.	Bridge.	397.882	1305.385
Westcooling Park, Pa.	665 A.	202.881	665.619	Swains, N. Y.	1316 R.	401.318	1316.657
Shohola, Pa.	648 A.	197.813	648.921	Near Swains, N. Y.	Bridge 9.	395.358	1297.104
Near Pondeddy, Pa.	573 A.	175.027	574.234	Do.	Bridge 8.	388.890	1275.686
Near Mill Rift, Pa.	491 A.	149.923	491.872	Near Canaseraga, N. Y.	Bridge 61.	384.119	1260.329
Fort Jervis, N. Y.	456 A.	139.317	457.076	Canaseraga, N. Y.	1253 R.	382.211	1253.971
Guymard, N. Y.	780 A.	254.023	780.914	Burns, N. Y.	Tel. pole.	365.016	1197.557
Otisville, N. Y.	801 A.	262.805	862.219	Near Burns, N. Y.	Culvert.	362.745	1190.106
Middletown, N. Y.	558 A.	170.359	558.919	Arkport, N. Y.	1188 R.	362.190	1188.285
Campbell Hall, N. Y.	408 A.	124.687	409.077	Near Arkport, N. Y.	Bridge 4.	356.311	1168.997
Walden, N. Y.	National Bank	114.342	375.137	Near Hornellsville, N. Y.	Bridge 1.	352.324	1169.040
Loyd, N. Y.	Centerville Hotel.	109.172	358.175				
Highland, N. Y.	Bridge.	86.117	282.535				
Poughkeepsie, N. Y.	Bridge.	68.662	225.269				
Do.	173 A.	52.728	172.992				
Maywood, N. Y.	1344 A.	409.775	1344.403	Buffalo, N. Y.	L. V. R. R.	178.683	586.229
Near Northfield, N. Y.	1766 A.	538.552	1766.899	Do.	Switch tower.	179.708	589.592
Do.	Bridge.	400.106	1312.681	Do.	Bridge.	178.509	585.058
Walton, N. Y.	1215 A.	370.653	1216.051	Do.	R. R. B. M.	180.278	591.462
Near Rock Rift, N. Y.	1214 A.	370.259	1214.758	Near West Seneca, N. Y.	Bridge.	179.576	589.159
Near Cadonia, N. Y.	990 A.	301.927	990.572	Do.	N. Y. C. R. R.	180.220	591.272
Near Hancock, N. Y.	Bridge 18.	278.205	912.744	Near Blasdell, N. Y.	Culvert.	183.748	602.847
				Near Athol Springs, N. Y.	11th mile post.	195.236	640.537
				Do.	631 R.	192.363	631.111
				Near Lake View, N. Y.	Culvert.	202.859	665.546
				Near Derby, N. Y.	724 R.	220.617	723.808
				Do.	Trestle 236.	207.595	681.085
				Near Angola, N. Y.	Trestle.	207.284	680.064
				Do.	Bridge 228.	192.925	632.955
Utica, N. Y.	D. W. Utica 2.	123.470	405.084	Farnham, N. Y.	633 R.	185.975	610.153
Do.	P. O.	127.165	417.207	Near Farnham, N. Y.	Culvert 218.	180.111	590.914
Do.	Seneca Street Bridge.	131.107	430.140	Near Irving, N. Y.	Bridge 216.	187.131	613.946
Do.	Whitaboro Street Bridge.	131.538	431.554	Near Silver Creek, N. Y.	Bridge.	189.618	622.105
Near Washington Mills, N. Y.	633 A.	193.056	633.384	Near Silver Creek, N. Y.	Bridge 207.	191.420	628.017
Richfield Junction, N. Y.	Station.	358.946	1177.642	Near Waites Crossing, N. Y.	Bridge.	190.003	623.368
Near Richfield Junction, N. Y.	1221 A.	372.318	1221.513	Do.	Bridge 195.	190.228	624.106
Leonardsville, N. Y.	1152 A.	351.298	1152.550	Near Dunkirk, N. Y.	Culvert 187.	187.335	614.615
West Edmeston, N. Y.	U. S. B. M.	345.709	1134.214				
Near West Edmeston, N. Y.	Bridge.	343.565	1127.170				
Near South Edmeston, N. Y.	1110 A.	338.324	1109.985	Near Leboeuf, Pa.	Bridge.	366.159	1201.307
New Berlin, N. Y.	1089 A.	332.016	1089.289	Near Union City, Pa.	11th mile post.	383.927	1259.600
Near New Berlin, N. Y.	Bridge.	332.636	1091.323	Do.	12th mile post.	391.478	1284.374
Near South New Berlin, N. Y.	do.	321.514	1087.834	Do.	13th mile post.	397.130	1302.917
South New Berlin, N. Y.	1059 A.	322.987	1059.666	Do.	Bridge 27.	392.927	1289.128
Near South New Berlin, N. Y.	Bridge.	327.430	1074.243	Do.	Bridge 29.	396.968	1302.058
Near Holmesville, N. Y.	do.	321.423	1054.535	Do.	P. R. R. 72.	398.646	1307.891
Mount Upton, N. Y.	1035 A.	315.685	1035.710	Near Elgin, Pa.	P. R. R. 71.	417.446	1369.571
Near Mount Upton, N. Y.	Bridge.	310.003	1017.068	Do.	P. R. R. 70.	420.471	1379.495
Sidney, N. Y.	Tel. pole 991.	302.093	991.117	Elgin, Pa.	1382 P.	421.172	1381.795
				Near Lovell, Pa.	P. R. R. 69.	416.564	1366.677
				Do.	P. R. R. 68.	418.372	1372.609
				Near Corry, Pa.	P. R. R. 67.	421.295	1382.199
				Do.	P. R. R. 66.	430.613	1412.769
				Do.	1432 P.	436.578	1432.340
				Near Colza, Pa.	P. R. R. 64.	425.967	1397.527
				Near Roach, Pa.	P. R. R. 62.	421.896	1384.170
				Spring Creek, Pa.	1406 P.	428.426	1405.594
				Near Spring Creek, Pa.	P. R. R. 58.	423.686	1390.043
				Do.	P. R. R. 57.	425.164	1394.892
				Do.	P. R. R. 56.	419.359	1375.847
				Near Horn, Pa.	P. R. R. 55.	416.338	1366.592
				Do.	P. R. R. 54.	403.048	1322.333
				Near Garland, Pa.	P. R. R. 51.	391.090	1285.070
				Near Pittsfield, Pa.	P. R. R. 50.	385.484	1264.709
				Do.	1244 P.	348.768	1144.250
				Do.	P. R. R. 47.	377.247	1237.684
				Do.	P. R. R. 46.	375.270	1231.198
				Near Youngsville, Pa.	P. R. R. 45.	372.445	1221.902
				Do.	P. R. R. 43.	367.902	1207.025
				Do.	P. R. R. 43.	360.206	1211.303
				Near Irvineton, Pa.	P. R. R. 42.	357.541	1173.032
				Morehead City, N. C.	7 M. C.	2.119	6.952
				Do.	17 M. C.*	6.167	16.952
				Near Atlantic, N. C.	18 M. C.	5.652	18.543
				Near Newport, N. C.	28 M. C.	8.574	28.130
				Near Havelock, N. C.	26 M. C.	8.098	26.568
				Riverdale, N. C.	25 M. C.	7.617	24.990
				Near Newbern, N. C.	7 M. C.	2.157	7.077
				Newbern, N. C.	16 M. C.	4.530	14.862
				Near Clark, N. C.	27 M. C.	8.084	26.522
				Near Tuscarora, N. C.	51 M. C.	15.198	49.862
				Cove Creek, N. C.	48 M. C.	14.267	46.808
				Dover, N. C.	64 M. C.	19.154	62.841
				Kinston, N. C.	48 M. C.	13.556	44.819

* Reported destroyed in 1907.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Falling Creek, N. C.	55 M. C.	16.587	54.419	PHELPS, Ga.	712 M. C.	216.800	711.285
Lagrange, N. C.	109 M. C.	33.039	108.395	Miller, Ga.	719 M. C.	218.772	717.754
Near Bests, N. C.	120 M. C.	36.204	118.779	Near Oostanaula, Ga.	620 M. C.	188.666	618.982
Goldsboro, N. C.	111 M. C.*	33.582	110.177	Pinson, Ga.	653 M. C.	198.644	651.718
Do.	111 A.†	35.007	114.852	Rome, Ga.	614 M. C.	186.723	612.607
Rose, N. C.	136 M. C.	41.162	135.046	Chambers, Ga.	697 M. C.	212.126	695.950
Princeton, N. C.	152 M. C.	46.070	151.148	Near Seney, Ga.	799 M. C.	243.221	797.968
Selma, N. C.	178 M. C.	54.047	177.319	Rockmart, Ga.	774 M. C.	232.488	762.754
Wilsons Mills, N. C.	229 M. C.	69.616	228.398	Near Braswell, Ga.	1088 M. C.	331.341	1087.074
Clayton, N. C.	346 M. C.	105.099	344.812	McPherson, Ga.	1015 M. C.	309.034	1013.889
Garner, N. C.	384 M. C.	116.643	382.686	Dallas, Ga.	1050 M. C.	319.900	1049.539
Raleigh, N. C.	363 M. C.	110.470	362.434	Near Powder Springs, Ga.	957 M. C.	291.441	956.109
Cary, N. C.	497 M. C.	151.101	495.737	Austell, Ga.	930 M. C.	283.216	929.184
Near Morrisville, N. C.	321 M. C.	97.663	320.416	Near Lenox, Ga.	894 M. C.	264.982	893.745
Near Nelson, N. C.	360 M. C.	109.458	359.113	Peyton, Ga.	855 M. C.	260.422	854.401
Durham, N. C.	406 M. C.	123.498	405.176	Atlanta, Ga.	1050 M. C.	319.902	1049.545
University Station, N. C.	471 M. C.	143.422	470.544	Constitution, Ga.	847 M. C.	258.168	847.006
Near Blackwood, N. C.†	549 M. C.	167.153	548.401	Ellenwood, Ga.	848 M. C.	258.390	847.734
Chapel Hill, N. C.	503 M. C.	152.945	501.787	Stockbridge, Ga.	810 M. C.	246.750	809.546
Hillsboro, N. C.	543 M. C.	165.255	542.174	McDonough, Ga.	866 M. C.	263.787	865.441
Elband, N. C.	667 M. C.	202.960	665.878	Locust Grove, Ga.	837 M. C.	254.885	836.235
Mebane, N. C.	678 M. C.	206.305	676.832	Jenkinsburg, Ga.	766 M. C.	233.218	765.149
Graham, N. C.	642 M. C.	195.399	641.071	Jackson, Ga.	727 M. C.	221.373	726.288
Gibsonville, N. C.	721 M. C.	219.434	719.926	Cork, Ga.	546 M. C.	166.298	545.596
McLeansville, N. C.	744 M. C.	226.571	743.342	Juliette, Ga.	375 M. C.	114.312	375.039
Greensboro, N. C.	839 M. C.	255.585	838.532	Dames Ferry, Ga.	347 M. C.	105.663	346.663
Near Pomona, N. C.	813 M. C.	247.570	812.236	Holton, Ga.	339 M. C.	103.246	338.733
Jamestown, N. C.	793 M. C.	241.497	792.311	Macon, Ga.	334 M. C.	101.788	333.949
High Point, N. C.	940 M. C.	286.162	938.850	Reid, Ga.	272 M. C.	82.820	271.719
Thomasville, N. C.	852 M. C.	259.318	850.779	Bullard, Ga.	259 M. C.	78.781	258.467
Near Conrad, N. C.	665 M. C.	202.455	664.221	Adams Park, Ga.	259 M. C.	78.834	258.641
Lexington, N. C.	811 M. C.	246.737	809.503	Westlake, Ga.	234 M. C.	71.363	234.130
Near Linwood, N. C.	630 M. C.	191.787	629.251	McGriff, Ga.	259 M. C.	78.796	258.517
Salisbury, N. C.	765 M. C.	232.907	764.129	Cochran, Ga.	342 M. C.	104.081	341.472
Near Majolica, N. C.	671 M. C.	204.084	669.566	Empire, Ga.	381 M. C.	116.181	381.170
Cleveland, N. C.	790 M. C.	240.379	788.643	Gresson, Ga.	400 M. C.	122.008	400.288
Elmwood, N. C.	838 M. C.	254.982	836.553	Eastman, Ga.	357 M. C.	108.722	356.699
Statesville, N. C.	926 M. C.	284.290	924.834	Godwinsville, Ga.	312 M. C.	94.933	311.459
Plott, N. C.	776 M. C.	236.246	775.084	Chauncey, Ga.	300 M. C.	91.225	299.294
Catawba, N. C.	873 M. C.	265.756	871.901	Achord, Ga.	275 M. C.	83.677	274.530
Claremont, N. C.	970 M. C.	295.223	968.577	McRae, Ga.	229 M. C.	69.899	229.327
Newton, N. C.	996 M. C.	303.218	994.808	Scotland, Ga.	142 M. C.	43.211	141.768
Hickory, N. C.	1164 M. C.	354.509	1163.085	Towns, Ga.	128 M. C.	38.864	127.506
Near Hildebran, N. C.	1087 M. C.	330.907	1085.651	Lumber City, Ga.	146 M. C.	44.342	145.479
Connolly Springs, N. C.	1193 M. C.	363.250	1191.763	Hazelhurst, Ga.	256 M. C.	77.919	255.639
Drexel, N. C.	1193 M. C.	363.209	1191.628	Graham, Ga.	244 M. C.	74.339	243.894
Morganton, N. C.	1182 M. C.	359.901	1180.775	Pine Grove, Ga.	229 M. C.	69.835	229.171
Glen Alpine, N. C.	1215 M. C.	370.011	1213.944	Baxley, Ga.	206 M. C.	62.754	205.885
Near Bridgewater, N. C.	1091 M. C.	331.095	1089.548	Wheaton, Ga.	200 M. C.	61.106	200.479
Nebo, N. C.	1298 M. C.	395.207	1296.608	Surrency, Ga.	187 M. C.	56.824	186.430
Marion, N. C.	1438 M. C.	437.955	1436.857	Brentwood, Ga.	167 M. C.	50.809	166.696
Greenlee, N. C.	1296 M. C.	391.496	1294.433	Odum, Ga.	155 M. C.	47.186	154.809
Old Fort, N. C.	1437 M. C.	437.722	1436.093	Cesup, Ga.	99 M. C.	30.326	99.495
Round Knob, N. C.	1829 M. C.	557.229	1828.175	Gardi, Ga.	61 M. C.	18.697	61.342
Mud Cut, N. C.	2153 M. C.	655.801	2151.574	Pendarvis, Ga.	85 M. C.	25.948	85.131
Near Swannanoa, N. C.	2222 M. C.	768.302	2220.671	Mount Pleasant, Ga.	55 M. C.	16.899	55.443
Swannanoa, N. C.	2222 M. C.	768.777	2220.392	Everett, Ga.	16 M. C.	4.970	16.306
Azalea, N. C.	2057 M. C.	626.660	2055.967	Sapps Still, Ga.	18 M. C.	5.559	18.238
Biltmore, N. C.	1996 M. C.	607.966	1994.438	Near Dock Junction, Ga.	24 M. C.	7.512	24.646
Asheville, N. C.	1986 M. C.	604.884	1984.523	Brunswick, Ga.	10 M. C.	3.258	10.689
Near Olivette, N. C.	1924 M. C.	586.114	1922.942	Do.	U. S. E. 1	2.334	7.657
Alexander, N. C.	1796 M. C.	546.976	1794.537	Do.	U. S. E. 2	2.622	8.625
Bailey, N. C.	1729 M. C.	526.756	1728.199	Do.	U. S. E. 3	2.094	6.870
Marshall, N. C.	1646 M. C.	501.456	1645.193	Near Black Fox, Tenn.	789 N.	239.658	786.278
Barnard, N. C.	1529 M. C.	465.858	1528.402	Near Hinchey Switch, Tenn.	854 N.	258.870	849.309
Hot Springs, N. C.	1326 M. C.	431.889	1325.027	Ooltawah Junction, Tenn.	Ledge of Rock	237.397	778.860
Paint Rock, N. C.	1259 M. C.	383.272	1257.452	Tyners, Tenn.	716 N.	216.670	710.858
Near Wolf Creek, Tenn.	1184 M. C.	360.575	1182.986	Near McCarty, Tenn.	Bridge	206.239	676.636
Near Delrio, Tenn.	1141 M. C.	347.384	1139.709	McCarty, Tenn.	Bridge	204.939	672.371
Bridgeport, Tenn.	1094 M. C.	333.247	1093.328	Boyce, Tenn.	688 N.	208.183	683.014
Newport, Tenn.	1058 M. C.	322.180	1057.019	Chattanooga, Tenn.	698 N.	211.169	692.810
Rankin, Tenn.	1010 M. C.	307.493	1008.833	Cleveland, Ohio.	U. S. E. 2	176.094	577.735
White Pine, Tenn.	1142 M. C.	347.809	1141.103	Do.	U. S. E. 1	177.213	581.406
Morristown, Tenn.	1351 M. C.	411.412	1349.774	Do.	U. S. E. 3	181.273	594.726
Talbot, Tenn.	1193 M. C.	363.276	1191.848	Do.	Gauge	174.552	572.676
Mossy Creek, Tenn.	1118 M. C.	340.344	1116.612	Do.	Bridge	180.421	591.931
Near Hodges, Tenn.	905 M. C.	275.525	903.952	Near Cleveland, Ohio.	Bridge 15	250.765	822.718
Near Mascot, Tenn.	865 M. C.	263.238	863.640	Near Bedford, Ohio.	R. R. B. M.	276.303	906.504
Near Caswell, Tenn.	867 M. C.	264.001	866.143	Bedford, Ohio.	Town Hall	289.452	949.644
Knoxville, Tenn.	933 M. C.	284.085	932.035	Near Macedonia, Ohio.	Bridge	316.614	1038.758
Near Wright, Tenn.	940 M. C.	286.247	939.129	Macedonia, Ohio.	1004 Cleve.	305.836	1003.397
Concord, Tenn.	820 M. C.	249.536	818.686	Little York, Ohio.	Wall	295.651	969.982
Lenoir City, Tenn.	799 M. C.	243.249	798.059	Highland Springs, Ohio.	Rock	325.845	1069.043
Loudon, Tenn.	784 M. C.	238.548	782.636	Near Seasons, Ohio.	1002 Cleve.	305.540	1002.426
Philadelphia, Tenn.	860 M. C.	261.708	858.620	Silver Lake Junction, Ohio	1012 Cleve.	308.518	1012.196
Sweetwater, Tenn.	918 M. C.	279.582	917.262	East Akron Junction, Ohio.	Wall	293.744	963.725
Mouse Creek, Tenn.	979 M. C.	297.974	977.603	Do.	Do.	Do.	Do.
Athens, Tenn.	869 M. C.	264.485	867.731	East Akron, Ohio.	983 Cleve.	299.751	983.433
Riceville, Tenn.	807 M. C.	245.740	806.232	Myersville, Ohio.	1076 Cleve.	327.790	1075.424
Near Charleston, Tenn.	706 M. C.	214.992	705.353	New Berlin, Ohio.	1069 Canton	325.490	1067.878
Near Tasso, Tenn.	798 M. C.	243.055	797.423	Near New Berlin, Ohio.	Bridge 43	322.458	1057.931
Cleveland, Tenn.	875 M. C.	266.310	873.719	Do.	Bridge 44	320.177	1050.447
Blue Springs, Tenn.	895 M. C.	272.584	894.303				
Cohutta, Ga.	866 M. C.	263.874	865.727				
Waring, Ga.	795 M. C.	242.016	794.014				
Dalton, Ga.	774 M. C.	235.738	773.417				

* Reported destroyed in 1913.
† Formerly called Robson.

† Established by Mr. W. E. Gehres, city engineer, Goldsboro, N. C.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Fruitland, Tex.	H.	321.199	1053.800	Lebanon, Pa.	No. XXVI.	144.651	474.576
Sunset, Tex.	I.	304.720	999.736	Do.	K.	141.982	465.754
Alvord, Tex.	J.	269.984	885.772	Near Annville, Pa.	No. XXVII.	123.399	405.212
Cowen, Tex.	K.	266.043	872.842	Near Beaver, Pa.	No. XXVIII.	112.063	367.660
Decatur, Tex.	L.	334.222	1096.526	Harrisburg, Pa.	No. XXIX.	108.740	356.758
Herman, Tex.	M.	282.661	927.303	Do.	L.	112.034	367.585
Rhomb, Tex.	N.	285.939	938.089	Carlisle, Pa.	M.	144.203	473.106
Avondale, Tex.	O.	256.415	841.255	Shippensburg, Pa.	No. XXX.	199.270	653.771
Near Saginaw, Tex.	P.	229.000	751.311	Chambersburg, Pa.	N.	189.106	620.425
Fort Worth, Tex.	Q.	191.466	628.168	Greencastle, Pa.	No. XXXI.	179.346	588.494
Do.	R.	163.873	537.640	Hagerstown, Md.	A.	168.284	552.033
Do.	S.	161.660	530.380	Near Hagerstown, Md.	No. I.	171.779	563.578
Do.	T.	173.574	569.467	Do.	No. II.	176.942	580.517
Do.	U.	184.668	605.865	Near Williamsport, Md.	No. IV.	156.727	494.510
Do.	V.	188.749	619.254	Do.	No. V.	156.317	447.233
Fort Worth, Tex.	M.	188.595	618.749	Williamsport, Md.	B.	109.043	357.752
Near Belt Junction, Tex.	N.	199.609	654.884	Near Williamsport, Md.	C.	113.273	371.680
Primrose, Tex.	O.	234.932	770.773	Do.	No. VI.	113.190	371.358
Virgile, Tex.	P.	287.910	944.585	Do.	D.	123.213	404.241
Near Cresson, Tex.	Q.	318.550	1045.109	Near Cherry Run, Md.	No. VII.	123.589	405.475
Waples, Tex.	R.	256.456	841.389	Near Hancock, Md.	E.	123.329	404.022
Granbury, Tex.	S.	220.989	725.028	Do.	No. VIII.	127.475	418.224
Near Granbury, Tex.	Comanche Δ.	374.658	1229.190	Hancock, Md.	F.	128.254	420.714
Do.	Comanche Ref. Mk.	373.964	1226.914	Near Hancock, Md.	No. IX.	130.172	427.073
Near Bethel, Tex.	T.	207.974	682.328	Do.	G.	135.274	443.811
Burleson, Tex.	U.	217.952	715.064	Do.	No. X.	137.653	451.617
Egan, Tex.	V.	252.164	827.308	Near Little Orleans, Md.	No. XI.	159.540	458.136
Do.	R. R.	255.212	837.308	Little Orleans, Md.	No. XII.	140.112	459.684
Alvarado, Tex.	W.	206.728	678.240	Near Little Orleans, Md.	No. XIII.	142.525	467.601
Conley, Tex.	X.	227.260	745.602	Do.	H.	150.056	492.309
Grand View, Tex.	Y.	213.109	699.175	Do.	No. XIV.	162.283	532.358
Itasca, Tex.	Z.	215.966	708.548	Near Oldtown, Md.	No. XV.	164.712	540.390
Schofield, Tex.	A.	200.082	656.435	Near Cumberland, Md.	No. XVI.	179.124	587.676
Hillsboro, Tex.	B.	193.171	633.762	Cumberland, Md.	I.	190.124	623.783
Near Abbott, Tex.	C.	211.635	694.339	Near Cumberland, Md.	No. XVII.	197.326	647.394
West, Tex.	D.	199.807	655.534	Do.	No. XVIII.	211.529	694.191
Elm Mott, Tex.	E.	156.910	514.796	Near Keyser, W. Va.	J.	244.701	802.823
Waco, Tex.	F.	125.909	413.087	Bloomington, Md.	No. XX.	307.391	1008.499
Do.	Hydrant 1.	122.805	402.902	Near Bloomington, Md.	No. XXV.	693.305	2274.618
Do.	Hydrant 2.	130.029	426.603	Near Deer Park, Md.	No. XXIII.	748.578	2455.960
Do.	G.	126.304	414.382	Near Oakland, Md.	No. XXII.	752.840	2404.326
Hewitt, Tex.	H.	199.685	655.134	Do.	No. XXI.	724.927	2378.365
Lorena, Tex.	I.	179.600	589.237	Do.	K.	724.059	2375.517
Eddy, Tex.	J.	204.513	670.973	Near Hutton, Md.	No. XXIV.	741.989	2434.342
Troy, Tex.	K.	206.686	678.102	Near Cranberry Summit, W. Va.	No. XXVI.	756.159	2480.832
Temple, Tex.	L.	205.254	673.404	Do.	No. XXVII.	747.554	2452.600
Temple, Tex.	M.	214.198	702.748	Amblesburg, W. Va.	L.	494.894	1623.665
Do.	N.	209.543	687.476	Rowlesburg, W. Va.	No. XXVIII.	426.822	1400.332
Near Belton, Tex.	O.	155.003	508.539	Near Rowlesburg, W. Va.	No. XXIX.	523.329	1716.955
Nolanville, Tex.	P.	203.096	666.324	Near Grafton, W. Va.	No. XXX.	311.956	1023.476
Near Killeen, Tex.	Q.	239.975	787.318	Grafton, W. Va.	M.	303.674	996.054
Near Copperas Cove, Tex.	R.	286.491	939.929	Near Grafton, W. Va.	No. XXXI.	329.821	1082.088
Do.	S.	326.857	1072.363	Near Bridgeport, W. Va.	No. XXXII.	298.441	979.135
Do.	Gilmore Δ.	392.130	1286.513	Near West Union, W. Va.	No. XXXIII.	243.778	799.795
Do.	Gilmore Ref. Mk.	390.654	1281.671	West Union, W. Va.	N.	245.206	801.180
Near Kempner, Tex.	T.	272.514	894.073	Near West Union, W. Va.	No. XXXIV.	244.593	802.469
Near Lampasas, Tex.	U.	298.904	980.654	Cornwall, W. Va.	No. XXXV.	211.398	693.592
Do.	Lampasas.	315.434	1034.886	Near Cairo, W. Va.	No. XXXVI.	208.988	685.655
Do.	N.E. Base Δ.			Petroleum, W. Va.	No. XXXVII.	212.343	697.062
Do.	Lampasas.	381.574	1251.881	Near Petroleum, W. Va.	No. XXXVIII.	211.198	692.905
Do.	S.W. Base Δ.			Near Parkersburg, W. Va.	No. XXXIX.	185.092	607.256
Little River, Tex.	V.	150.154	492.630	Parkersburg, W. Va.	O.	187.639	615.612
Holland, Tex.	X.	160.942	528.024	Belpre, Ohio.	No. XL.	189.290	621.029
Do.	Y.	*161.108	528.568	Little Hocking, Ohio.	No. XLI.	190.012	623.398
Hunters Point, N. Y.	B. M. 39.	3.496	11.470	Near Coolville, Ohio.	No. XLII.	184.756	606.154
Near Metuchen, N. J.	No. IX.	25.491	83.632	Do.	No. XLIII.	184.756	606.154
South Plainfield, N. J.	No. X.	19.460	63.845	Near Stewart, Ohio.	No. XLVIII.	187.558	615.347
Near Bound Brook, N. J.	No. XI.	9.897	32.470	Do.	No. XLVII.	187.885	616.419
Near New Market, N. J.	No. XII.	14.986	49.167	Near Guysville, Ohio.	No. XLIV.	188.167	617.345
Bound Brook, N. J.	No. XIII.	10.891	35.732	Do.	No. XLV.	189.552	621.889
Somerville, N. J.	No. XIV.	24.933	81.801	Near Canaanville, Ohio.	No. XLVI.	190.125	623.768
Do.	G.	27.823	91.283	Do.	No. XLIX.	192.124	630.327
North Branch, N. J.	No. XV.	25.872	84.882	Athens, Ohio.	No. L.	197.867	649.169
Near Annandale, N. J.	No. XVI.	108.243	355.127	Do.	P.	199.981	656.104
Near Bloomsbury, N. J.	No. XVII.	99.443	326.256	Moonville, Ohio.	No. LI.	217.047	712.161
Near Phillipsburg, N. J.	No. XVIII.	80.171	263.028	Near Zaleski, Ohio.	No. LII.	217.720	714.303
Easton, Pa.	No. XIX.	65.359	214.432	Near Hamden, Ohio.	No. LIII.	215.249	706.196
Do.	No. XX.	108.887	357.240	Near Londonderry, Ohio.	No. LIV.	183.075	601.000
Do.	H.	110.809	363.546	Near Schooley, Ohio.	No. LV.	200.428	657.571
Allentown, Pa.	I.	97.905	321.210	Chillicothe, Ohio.	Q.	194.463	638.001
Near Allentown, Pa.	No. XXI.	90.190	295.898	Near Musselmans Junction, Ohio.	No. LVI.	213.252	699.644
Near Macungie, Pa.	No. XXII.	116.960	383.726	Do.	No. LVII.	217.075	712.187
Near Shamrock, Pa.	No. XXIII.	129.334	424.323	Near Lyndon, Ohio.	No. LVIII.	277.878	911.671
Reading, Pa.	J.	80.458	264.002	Martinsville, Ohio.	No. LIX.	322.055	1056.609
Near Robeson, Pa.	No. XXIV.	131.883	432.699	Near Clinton Valley, Ohio.	No. LX.	301.767	990.407
Near Womelsdorf, Pa.	No. XXV.	147.323	483.342	Near Loveland, Ohio.	No. LXI.	211.204	692.925
				Loveland, Ohio.	R.	177.358	581.882
				Near Remington, Ohio.	No. LXII.	180.095	590.862
				Near Cummins, Ohio.	No. LXIII.	154.359	506.426
				Cincinnati, Ohio.	No. LXIV.	150.821	494.819
				Do.	S.	150.718	494.481
				Do.	Tor City B. M. No. 1.	166.585	546.538
				Near Lawrenceburg, Ind.	No. LXVI.	147.044	482.427
				Lawrenceburg, Ind.	U.	148.115	485.941

* Destroyed, 1903.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Cochran, Ind.	No. LXVII.	150.432	493.542	Near Lecompton, Kans.	J.	256.998	843.168
Near Delaware, Ind.	No. LXVIII.	282.829	927.915	Do.	J.	257.927	846.216
Near North Vernon, Ind.	No. LXIX.	208.716	684.762	Near Grover, Kans.	K.	261.354	857.459
Near Medora, Ind.	V.	162.711	533.828	Near Tecumseh, Kans.	L.	263.896	865.798
Near Fort Ritner, Ind.	No. LXX.	158.956	521.508	Topeka, Kans.	M.	270.718	888.181
Near Scottsville, Ind.	W.	157.002	515.097	Do.	B. M. Jennings.	283.018	928.535
Mitchell, Ind.	X.	209.310	686.711	Do.	O.	284.360	932.937
West Shoals, Ind.	Y.	159.096	521.967	Do.	N.	269.115	882.922
Washington, Ind.	Z.	155.203	509.195	Silver Lake, Kans.	P.	278.820	914.762
Vincennes, Ind.	A.	132.237	433.848	Near Rossville, Kans.	Q.	283.312	929.500
Do.	No. I.	131.042	429.927	St. Marys, Kans.	R.	294.297	965.539
Olney, Ill.	B.	148.169	486.118	Near Belvue, Kans.	S.	293.010	961.317
Do.	No. II.	146.429	480.409	Wamego, Kans.	T.	302.066	991.029
Near Clay City, Ill.	No. III.	130.656	428.661	St. George, Kans.	U.	305.837	1003.400
Flora, Ill.	C.	149.300	489.828	Manhattan, Kans.	V.	306.772	1006.468
Near Iuka, Ill.	No. IV.	143.641	471.262	Ogden, Kans.	W.	322.604	1058.410
Salem, Ill.	D.	165.911	544.326	Fort Riley, Kans.	X.	326.123	1069.955
Odin, Ill.	No. V.	160.829	527.653	Junction City, Kans.	Y.	329.267	1080.270
Near Sandoval, Ill.	No. VI.	148.940	488.647	Near Chapman, Kans.	Z.	337.404	1106.967
Near Huey, Ill.	No. VII.	136.185	446.800	Chapman, Kans.	A.	340.918	1118.495
Near Carlyle, Ill.	E.	133.798	438.969				
Carlyle, Ill.	F.	142.818	468.562	Bavaria, Kans.	I.	388.525	1274.685
Near Aviston, Ill.	No. VIII.	137.971	452.660	Brookville, Kans.	J.	414.297	1359.239
Lebanon, Ill.	G.	139.444	457.493	Near Terra Cotta, Kans.	K.	440.902	1446.526
Near Caseyville, Ill.	No. IX.	137.098	449.796	Kanopolis, Kans.	L.	483.234	1585.410
Near East St. Louis, Ill.	H.	158.999	521.649	Ellsworth, Kans.	M.	469.497	1540.341
East St. Louis, Ill.	I.	126.179	413.972	Do.	N.	469.396	1540.010
St. Louis, Mo.	J.	126.181	413.979	Do.	Water gauge B. M.	464.546	1524.098
				Wilson, Kans.	O.	515.085	1689.908
Near Cole, Mo.	No. XXIX.	169.713	556.900	Do.	P.	515.447	1691.096
Scott, Mo.	No. XXX.	177.033	580.816	Dorrance, Kans.	Q.	527.837	1731.745
Elston, Mo.	No. XXXI.	213.096	699.132	Bunker Hill, Kans.	R.	568.813	1868.180
Centertown, Mo.	No. XXXII.	261.117	856.681	Do.	S. or Bunker Hill A.	570.030	1870.174
Do.	M. P. R. R. No. 114.	258.919	849.470	Near Homer, Kans.	T. or Russell SE.	573.091	1880.216
California, Mo.	No. XXXIII.	267.057	876.169		Base.		
Do.	M. P. R. R. No. 122.	271.067	889.326	Near Russell, Kans.	Russell NW. Base.	560.752	1839.734
Clarksburg, Mo.	No. XXXIV.	275.691	904.480	Russell, Kans.	U.	558.729	1833.096
Tipton, Mo.	No. XXXV.	282.007	925.218	Gorham, Kans.	V.	584.266	1916.879
Fortuna, Mo.	No. 14.	295.683	970.021	Walker, Kans.	W.	593.492	1947.148
Near Versailles, Mo.	Versailles North	322.290	1057.380	Victoria, Kans.	X.	587.547	1927.644
Do.	Base.			Hays, Kans.	Y.	609.061	1998.227
Near Syracuse, Mo.	Hunter A.	319.464	1048.108	Ellis, Kans.	Z.	647.282	2123.624
Near Otterville, Mo.	No. XXXVI.	281.657	924.070	Do.	A.	646.389	2120.695
Do.	No. XXXVII.	223.456	733.122	Do.	B.	646.274	2120.317
Do.	M. P. R. R. No. 143.	219.211	719.195	Ogallah, Kans.	C.	724.635	2377.073
Near Smithton, Mo.	No. XXXVIII.	269.197	883.190	Wakeeney, Kans.	D.	751.218	2464.621
Near Sedalia, Mo.	M. P. R. R. No. 152.	276.518	907.209	Collyer, Kans.	E.	787.100	2582.344
Sedalia, Mo.	No. XXXIX.	277.353	909.949	Quinter, Kans.	F.	786.736	2579.574
Near Sedalia, Mo.	No. XL.	226.237	742.246	Buffalo Park, Kans.	G.	838.421	2750.719
Lamonte, Mo.	No. XLI.	264.354	867.301	Grainfield, Kans.	H.	857.775	2814.217
Knobnoster, Mo.	No. XLII.	246.852	808.380	Grinnell, Kans.	I.	887.312	2911.123
Near Knobnoster, Mo.	M. P. R. R. No. 169.	226.782	744.034	Oakley, Kans.	J.	930.316	3052.212
Montserrat, Mo.	No. XLIII.	243.354	798.404	Monument, Kans.	K.	967.065	3172.779
Warrensburg, Mo.	No. XLIV or Nor-	267.741	878.414	Near Pago City, Kans.	L.	983.596	3227.014
Do.	mal A.			Winona, Kans.	M.	1013.459	3324.990
Center View, Mo.	No. XLV.	269.528	884.276	McAllister, Kans.	N.	961.834	3155.617
Holden, Mo.	No. XLVI.	265.948	872.531	Turkey Creek, Kans.	O.	984.997	3231.611
Near Holden, Mo.	No. XLVII.	260.289	853.965	Wallace, Kans.	P.	1010.198	3314.291
Do.	No. XLVIII or M.	244.336	801.626	Near Wallace, Kans.	Q.	1017.978	3339.816
Kingsville, Mo.	P. R. R. No. 188.			Sharon Springs, Kans.	R.	1052.927	3454.478
Near Strasburg, Mo.	No. XLIX.	279.758	917.839	Monotony, Kans.	S.	1152.144	3779.992
Pleasant Hill, Mo.	No. L.	255.390	837.892	Weskan, Kans.	T.	1167.234	3829.500
Near Pleasant Hill, Mo.	No. LI.	261.145	856.773	Near Weskan, Kans.	U.	1181.412	3876.016
Do.	M. P. R. R. No. 201.	259.590	854.874	Arapahoe, Colo.	A.	1223.320	4015.509
Near Greenwood, Mo.	No. LII.	259.932	852.794	Cheyenne Wells, Colo.	B.	1305.078	4281.744
Do.	M. P. R. R. No. 206.	280.167	919.181	First View, Colo.	C.	1395.817	4579.443
Lees Summit, Mo.	No. LIII.	280.159	919.155	Kit Carson, Colo.	D.	1306.898	4287.714
Near Little Blue, Mo.	No. LIV.	315.659	1035.625	Near Wild Horse, Colo.	E.	1351.804	4435.044
Near Independence, Mo.	No. LV.	240.058	787.590	Aroya, Colo.	F.	1390.845	4563.131
Independence, Mo.	No. LVI.	310.008	1017.085	Boyer, Colo.	G.	1444.872	4740.384
Do.	No. LVII.	320.459	1051.373	Mirage, Colo.	H.	1484.348	4869.898
Near Kansas City, Mo.	City Directrix.	319.943	1049.680	Hugo, Colo.	I.	1537.796	5045.252
Kansas City, Mo.	No. LVIII.	227.992	748.004	Do.	J.	1538.162	5046.453
Do.	Old M. R. C. B. M.	228.082	748.299	Do.	K.	1538.160	5046.446
Do.	241.			Near Lake, Colo.	L.	1596.418	5237.531
Do.	Old M. R. C. B. M.	230.132	755.025	Lake, Colo.	M.	1615.925	5301.580
Do.	243.			Limon, Colo.	N.	1631.997	5354.310
Do.	Old M. R. C. B. M.	229.973	754.503	Do.	O.	1638.995	5377.269
Do.	244.			Do.	P.	1638.983	5377.230
Do.	M. C. R. Y, Top of	* 228.624	750.077	Resolis, Colo.	Q.	1699.933	5577.197
Do.	Cap.			Mattison, Colo.	R.	1764.796	5790.002
Do.	Old M. R. C. B. M.	227.352	745.904	Ramah, Colo.	S.	1856.730	6091.622
Kansas City, Kans.	245.			Calhan, Colo.	T.	1984.169	6509.728
Argentine, Kans.	No. LIX.	228.203	748.696	Peyton, Colo.	U.	2073.906	6804.140
Near Holiday, Kans.	No. LX.	229.107	751.662	Falcon, Colo.	V.	2084.074	6837.499
Do.	No. LXI.	231.714	760.215	Do.	W.	2076.482	6912.591
Do.	No. LXII.	232.898	764.100	Elsmere, Colo.	X.	1957.205	6421.264
Near Cedar Junction,	No. LXIII.	232.918	764.165	Near Roswell, Colo.	Y.	1864.130	6115.900
Kans.	A.	238.332	781.927	Roswell, Colo.	Z.	1853.322	6080.441
Near De Soto, Kans.	B.	240.818	790.084	Colorado Springs, Colo.	A.	1725.151	5688.016
De Soto, Kans.	C.	243.259	798.093	Do.	B.	1823.075	5981.205
Near Weaver, Kans.	D.	243.732	799.644	City B. M.	City B. M.	1822.738	5980.100
Near Eudora, Kans.	E.	247.164	810.904	Do.	North Mast B. M.	1823.390	5982.239
Lawrence, Kans.	F.	251.830	826.212	Do.	South Mast B. M.	1823.077	5981.212
Do.	G.	249.112	817.295	Do.	Nail B. M.	1822.518	5979.378
Near Club House, Kans.	H.	252.746	829.217	Do.	Reference B. M.	1823.615	5982.977
				Do.	V. C. Post B. M.	1822.122	5978.079

* This elevation has been destroyed. For present elevation see p. 124.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Pike View, Colo.	C ₁	1894.918	6216.910	Russellville, Ark.	No. XVI.	106.904	350.735
Edgerton, Colo.	D ₁	1947.208	6388.465	Onita, Ark.	No. XVII.	108.601	356.298
Near Husted, Colo.	E ₁	1986.472	6517.283	Near Onita, Ark.	No. XVIII.	99.987	328.040
Husted, Colo.	F ₁	2007.206	6585.308	Near Mill Creek, Ark.	No. XIX.	99.462	326.121
Monument, Colo.	G ₁	2121.249	6959.465	London, Ark.	No. XX.	115.916	380.301
Palmer Lake, Colo.	H ₁	2112.300	6931.439	Near Berlin, Ark.	No. XXI.	103.182	338.523
Near Palmer Lake, Colo.	I ₁	2154.125	7067.325	Knoxville, Ark.	No. XXII.	130.649	395.530
Greenland, Colo.	J ₁	2100.963	6891.900	Lamar, Ark.	No. XXIII.	125.320	411.154
Larkspur, Colo.	K ₁	2035.638	6678.589	Near Clarksville, Ark.	No. XXIV.	114.669	376.210
Near Douglas, Colo.	L ₁	1923.193	6309.676	Clarksville, Ark.	No. XXV.	112.733	369.558
Castle Rock, Colo.	M ₁	1890.511	6202.452	Do.	No. XXVI.	112.352	368.608
Plateau, Colo.	N ₁	1832.754	6012.960	Spadra, Ark.	No. XXVII.	115.273	378.191
Sedalia, Colo.	O ₁	1779.963	5839.762	Hartman, Ark.	No. XXVIII.	123.903	406.702
Toluca, Colo.	P ₁	1710.901	5613.181	Coal Hill, Ark.	No. XXIX.	144.668	474.632
Near Acequia, Colo.	Q ₁	1677.569	5503.824	Altus, Ark.	No. XXX.	165.520	543.044
Wolhurst, Colo.	R ₁	1647.646	5405.652	Ozark, Ark.	No. XXXI.	122.021	400.330
Littleton, Colo.	S ₁	1634.447	5362.348	Poepping, Ark.	No. XXXII.	116.888	383.490
Petersburg, Colo.	T ₁	1609.734	5281.269	White Oak, Ark.	No. XXXIII.	120.941	396.788
Denver, Colo.	U ₁	1608.849	5278.365	Near Mulberry, Ark.	No. XXXIV.	117.366	385.058
Do.	V ₁	1608.602	5277.555	Dyer, Ark.	No. XXXV.	130.945	430.000
Do.	W ₁	1608.898	5278.527	Alma, Ark.	No. XXXVI.	132.735	435.482
Do.	X ₁	1580.959	5186.863	Van Buren, Ark.	No. XXXVII.	125.364	411.298
Do.	Y ₁	1580.341	5184.835	Do.	No. XXXVIII.	126.421	414.766
				Do.	No. XXXIX.	126.413	414.740
				Do.	No. XL.	126.370	414.599
River Bend, Colo.	N ₂	1675.061	5495.596	Fort Smith, Ark.	No. XLI.	136.571	448.067
Godfrey, Colo.	M ₂	1705.132	5594.234	Do.	No. XLII.	130.779	429.064
Agate, Colo.	L ₂	1664.263	5460.170	Near Little, Ark.	No. XLIII.	141.138	463.050
Lowland, Colo.	K ₂	1621.113	5318.602	Near Rudy, Ark.	No. XLIV.	163.619	536.807
Deer Trail, Colo.	J ₂	1579.807	5183.084	Near Lancaster, Ark.	No. XLV.	185.474	608.509
Byers, Colo.	I ₂	1585.246	5200.926	Near Mountainburg, Ark.	No. XLVI.	211.680	694.422
Bennett, Colo.	H ₂	1671.377	5483.510	Near Chester, Ark.	No. XLVII.	249.835	819.667
Watkins, Colo.	G ₂	1681.210	5515.769	Chester, Ark.	No. XLVIII.	257.003	845.153
Near Magnolia, Colo.	F ₂	1672.435	5486.960	Do.	No. XLIX.	256.468	841.428
Do.	E ₂	1646.790	5402.843	Porter, Ark.	No. C.	331.023	1086.031
Magnolia, Colo.	D ₂	1626.398	5335.941	Near Winslow, Ark.	No. CXXVII.	572.021	1876.706
Near Denver, Colo.	C ₂	1608.734	5277.988	Do.	No. CXXVI.	531.285	1743.058
Denver, Colo.	Z ₁	1585.483	5201.705	Brentwood, Ark.	No. CXXV.	454.371	1490.716
Do.	A ₂	1584.762	5199.340	Near Woolseys, Ark.	No. CXXIV.	419.644	1376.782
Do.	B ₂	1584.798	5199.458	West Fork, Ark.	No. CXXIII.	411.899	1351.372
				Greenland, Ark.	No. CXXII.	380.726	1249.099
				Fayetteville, Ark.	No. CXXI.	443.186	1454.019
Cairo, Ill.	P. B. M. 3.	99.736	327.217	Johnson, Ark.	No. CXX.	394.000	1291.440
Do.	P. B. M. 2.	97.326	319.310	Springdale, Ark.	No. CXIX.	406.399	1332.423
Do.	P. B. M. 1.	96.923	317.988	Lowell, Ark.	No. CXVIII.	409.481	1343.439
Near Mound City Jct., Ill.	No. II.	99.729	327.194	Rogers, Ark.	No. CXVII.	421.558	1383.062
Mound City Junction, Ill.	No. I.	98.172	322.086	Avoca, Ark.	No. CXVI.	415.074	1361.789
Villa Ridge, Ill.	Z ₃	117.624	385.905	Brightwater, Ark.	No. CXV.	385.981	1266.339
Do.	Y ₃	115.944	380.393	Garfield, Ark.	No. CXIV.	451.622	1521.001
Near Villa Ridge, Ill.	No. XII.	104.594	343.155	Seligman, Mo.	No. CXIII.	470.177	1542.572
Near Ulin, Ill.	No. 139.	102.395	335.941	Washburn, Mo.	No. CXII.	449.482	1474.675
Do.	X ₃	102.884	337.545	Exeter, Mo.	No. CXI.	475.705	1560.709
Anna, Ill.	W ₃	191.848	629.421	Purdy, Mo.	No. CX.	453.041	1486.352
Near Makanda, Ill.	V ₃	131.489	431.393	Monett, Mo.	No. CIX.	396.901	1302.166
Carbondale, Ill.	T ₃	126.692	415.655	Pierce City, Mo.	No. CVII.	366.453	1202.271
Near De Soto, Ill.	U ₃	117.553	385.672	Wentworth, Mo.	No. CVI.	373.567	1225.611
Duquoin, Ill.	R ₃	140.963	462.476	Sarcozie, Mo.	No. CV.	352.005	1089.253
Near Radom, Ill.	S ₃	152.343	499.812	Reeds, Mo.	No. CIV.	343.691	1127.598
Near Ashley, Ill.	Q ₃	170.312	558.765	Carthage, Mo.	No. CIII.	287.014	941.645
Near Richview, Ill.	P ₃	165.871	544.195	Near Carthage, Mo.	No. CII.	288.533	948.629
Centralia, Ill.	N ₃	150.754	494.599	Do.	No. CI.	294.273	965.461
Near Centralia, Ill.	O ₃	143.648	471.285	Do.	No. C.	280.727	921.018
Odin, Ill.	M ₃	161.190	528.838	Jasper, Mo.	No. XCIX.	289.121	948.121
				Boston, Mo.	No. XCVIII.	287.716	943.948
				Near Boston, Mo.	No. XCVII.	283.765	931.946
				Do.	No. XCVI.	283.764	930.982
Arkansas City, Ark.	F.	42.334	138.891	Lamar, Mo.	No. XCV.	298.647	979.811
Tillar, Ark.	H.	46.672	153.123	Near Lamar, Mo.	No. XCIV.	288.234	945.648
Walnut Lake, Ark.	I.	49.944	163.858	Irwin, Mo.	No. XCIII.	296.829	973.846
Varner, Ark.	J.	54.685	179.412	Sheldon, Mo.	No. XCII.	281.802	924.545
Noble Lake, Ark.	K.	61.803	202.765	Milo, Mo.	No. XCI.	267.977	879.188
Pine Bluff, Ark.	N.	68.463	224.616	Nevada, Mo.	No. XC.	262.768	862.098
Do.	L.	71.488	234.540	Near Horton, Mo.	No. LXXXIX.	228.038	748.155
Near Pine Bluff, Ark.	E.	103.769	340.449	Horton, Mo.	No. LXXXVIII.	220.392	726.219
Redfield, Ark.	D.	93.856	307.926	Near Arthur, Mo.	No. LXXXVII.	228.720	750.392
Wrightsville, Ark.	C.	78.704	258.215	Rich Hill, Mo.	No. LXXXVI.	245.536	805.393
Near Wrightsville, Ark.	No. II.	81.260	266.601	Do.	No. LXXXV.	245.530	805.443
Little Rock, Ark.	No. I or 3.	80.474	264.021	Near Rich Hill, Mo.	No. LXXXIV.	231.664	760.051
Do.	A.	91.208	299.238	Near Butler, Mo.	No. LXXXIII.	231.495	759.496
Do.	B.	90.805	297.916	Butler, Mo.	No. LXXXII.	263.869	865.710
Do.	O.	87.919	288.448	Passaic, Mo.	No. LXXXI.	263.738	865.281
Argenta, Ark.	West Base.	78.165	256.446	Adrian, Mo.	No. LXXX.	264.510	867.814
Near Little Rock, Ark.	No. I.	96.275	315.863	Near Archie, Mo.	No. LXXIX.	242.900	796.914
Marche, Ark.	No. II.	81.963	268.907	Archie, Mo.	No. LXXVIII.	255.181	837.207
Palmar, Ark.	No. III.	82.121	270.098	Near Archie, Mo.	No. LXXVII.	243.648	799.368
Mayflower, Ark.	No. IV.	87.592	287.375	Lone Tree, Mo.	No. LXXVI.	277.990	913.611
Preston, Ark.	No. V.	84.093	275.895	Harrisonville, Mo.	No. LXXV.	275.421	905.611
Conway, Ark.	No. VI.	97.705	320.553	Do.	No. LXXIV.	280.038	918.758
Near Conway, Ark.	No. VII.	100.783	330.652	Near Harrisonville, Mo.	No. 437.	309.456	1015.274
Near Menifee, Ark.	No. VIII.	86.498	283.786	Near Pleasant Hill, Mo.	Big Creek.	260.156	853.628
Menifee, Ark.	No. IX.	87.296	286.396				
Plumerville, Ark.	No. X.	89.200	292.659				
Morrilton, Ark.	No. XI.	118.367	388.342				
Germantown, Ark.	No. XII.	99.504	326.598				
Blackville, Ark.	No. XIII.	99.346	325.938	Kimpton, Mo.	No. LXXIII.	308.971	1013.682
Atkins, Ark.	No. XIV.	108.634	356.410	Coleman, Mo.	No. LXXII.	310.245	1017.962
Galla Creek, Ark.	No. XV.	113.311	371.755	Raymore, Mo.	No. LXXI.	336.819	1105.047
				Belton, Mo.	No. LXX.	337.269	1106.523

* Described as in Jersey, Colo. See p. 590 of Appendix 8, Report for 1899.

† No description is furnished for No. 43, as it was only a temporary bench mark, but its elevation is necessary as a junction point.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Newington, Kans.	No. LXIX.	265.239	870.205	Near Chunky, Miss.	E1.	90.842	298.037
Morse, Kans.	No. LXVIII.	333.491	1094.128	Graham, Miss.	F1.	94.356	309.566
Olathe, Kans.	No. LXVII.	315.584	1035.378	Near Meridian, Miss.	G1.	118.690	389.402
Do.	No. LXVI.	315.708	1035.785				
Do.	No. LXV.	* 314.085	1030.461				
Near Holliday, Kans.	No. LXIV.	237.736	779.972				
				Chewalla, Tenn.	L.	125.955	413.237
Delta, La.	No. 215.	* 28.005	91.880	Cypress Creek, Tenn.	M.	117.203	384.524
Near Delta, La.	No. 211.	27.891	91.506	Pocahontas, Tenn.	N.	122.101	400.593
On Elcho Plantation, La.	No. 207.	29.904	98.110	Middleton, Tenn.	O.	125.273	411.000
On Duck Port Plantation, La.	No. 197.	29.762	97.644	Saulsbury, Tenn.	P.	165.535	543.093
On Cabin Teale Plantation, La.	No. 188.	30.200	99.081	Grand Junction, Tenn.	R.	177.441	582.154
On River View Plantation, La.	No. 184.	28.905	94.832	La Grange, Tenn.	I.	162.644	533.608
Near Millikens Bend, La.	No. 179.	29.856	97.953	Do.	K.	162.676	533.713
Near Omega, La.	No. 171.	29.561	96.985	Moscow, Tenn.	H.	107.926	354.087
Near Hendersons Ldg., La.	No. 162.	31.167	102.254	Wolf River, Tenn.	G.	103.070	338.155
Do.	No. 161.	30.359	99.603	Rossville, Tenn.	F.	94.534	310.150
Near Ingomar, Miss.	No. 153.	31.958	104.849	Collierville, Tenn.	E.	117.950	386.974
Do.	No. 150.	32.292	105.945	Bailey, Tenn.	D.	109.020	357.676
On Shiloh Plantation, Miss.	No. 140.	33.946	111.371	Germantown, Tenn.	C.	115.653	379.438
Near Hays, Miss.	No. 137.	32.422	106.371	White, Tenn.	B.	95.931	314.734
Near Tallulah Ldg., Miss.	No. 128.	32.537	106.748	Bunton, Tenn.	A.	91.721	300.921
Do.	No. 124.	31.942	104.796	Memphis, Tenn.	P. B. M. Memphis.	80.644	264.580
On Ben Lomond Plantation, Miss.	No. 112.	33.404	109.593				
On Reserve Plantation, Miss.	No. 105.	33.194	108.904	Washington, D. C.	H.	11.362	37.277
Near Mayersville, Miss.	No. 95.	34.259	112.398	Do.	I.	6.286	20.623
Do.	No. 90.	33.976	111.470				
On Riverdale Plantation, Miss.	No. 83.	34.640	113.648	Mound, La.	P. B. M. 2.	25.445	83.481
On Palmetto Plantation, Miss.	No. 70.	34.898	114.495	California, La.	P. B. M. 3.	26.994	88.563
Near Leota, Miss.	No. 65.	36.880	120.997	Barnes, La.	P. B. M. 4.	24.804	81.378
Do.	No. 62.	36.724	120.485	Tallulah, La.	P. B. M. 5.	28.088	92.152
Near Lake Washington Landing, Miss.	No. 56.	36.070	118.340	Do.	P. B. M. 6.	27.692	90.833
On Longwood Plantation, Miss.	No. 46.	36.676	120.328	Near Lake One, La.	P. B. M. 7.	23.668	77.651
On Glenora Plantation, Miss.	No. 42.	36.780	120.669	Quebec, La.	P. B. M. 8.	22.990	75.426
On Auburn Plantation, Miss.	No. 39.	30.300	119.094	Near Quebec, La.	P. B. M. 9.	23.922	78.484
Near Lake See, Miss.	No. 33.	37.166	121.935	Dallas, La.	P. B. M. 10.	23.336	76.562
Refuge, Miss.	No. 22.	39.735	130.364	Waverly, La.	P. B. M. 11.	24.045	78.888
On Refuge Plantation, Miss.	No. 19.	39.992	131.207	Near Bayou Maçon, La.	P. B. M. 12.	22.729	74.570
Warfield Point, Miss.	No. 11.	39.557	129.780	Delhi, La.	P. B. M. 13.	28.854	94.665
Near Warfield Point, Miss.	No. 8.	40.015	131.283	Carpenter, La.	P. B. M. 14.	26.442	86.752
Near Greenville, Miss.	No. 5.	39.301	128.940	Holly Ridge, La.	P. B. M. 15.	26.018	85.361
Do.	No. 2.	40.577	133.126	Rayville, La.	P. B. M. 16.	24.593	80.686
Greenville, Miss.	Greenville No. 1.	40.083	131.506	Do.	P. B. M. 17.	26.922	88.327
				Near Rayville, La.	P. B. M. 18.	24.501	80.384
Georgetown, D. C.	No. XI.	9.646	31.647	Girard, La.	P. B. M. 19.	24.250	79.560
Great Falls, Md.	F.	50.778	166.594	Do.	P. B. M. 20.	26.392	86.588
Seneca, Md.	E.	60.470	198.392	Crew Lake, La.	P. B. M. 21.	20.369	66.827
Whites Ferry, Md.	No. V.	63.168	207.247	Gordon, La.	P. B. M. 23.	19.710	64.665
Point of Rocks, Md.	D.	† 68.310	224.114	Monroe, La.	P. B. M. 24.	21.914	71.896
Weyerton, Md.	C.	† 76.816	252.020	Do.	P. B. M. 25.	24.727	81.125
Near Keedysville, Md.	B.	119.349	391.564	Do.	P. B. M. 26.	24.775	81.283
				Do.	P. B. M. 27.	23.892	78.396
Kleinston, Miss.	A.	28.715	94.209	West Monroe, La.	P. B. M. 28.	23.145	75.935
Vicksburg, Miss.	B. M. Cistern.	59.090	193.864	Cheniere, La.	P. B. M. 29.	27.419	89.957
Do.	C.	62.526	206.154	Calhoun, La.	P. B. M. 30.	50.549	165.843
Do.	D.	60.344	197.979	Choudrant, La.	P. B. M. 32.	46.516	152.611
Near Vicksburg, Miss.	E.	76.036	249.461	Ruston, La.	P. B. M. 33.	95.947	314.786
Do.	F.	80.199	263.120	Near Ruston, La.	T. B. M. 72a=V. S.	74.424	244.173
Newmans, Miss.	G.	100.951	331.203	Do.	& P. R. R.		
Bovina, Miss.	H.	75.398	247.368	Allen Green, La.	V. S. & P. R. R.	73.611	241.505
Near Bovina, Miss.	I.	46.545	152.706	Simsboro, La.	P. B. M. 34.	100.733	330.488
Do.	J.	32.200	105.672	Arcadia, La.	P. B. M. 35.	97.727	320.626
Smiths, Miss.	K.	41.105	134.859	Gibbsland, La.	P. B. M. 36.	112.561	369.294
Edwards, Miss.	L.	68.950	226.213	Taylor, La.	P. B. M. 37.	73.834	242.237
Near Edwards, Miss.	M.	52.781	173.166	Near Dubberly, La.	P. B. M. 38.	66.618	218.563
Near Bolton, Miss.	N.	62.257	204.255	Do.	T. B. M. 91a=V. S.	81.934	268.812
Near Clinton, Miss.	O.	101.300	332.348	Dubberly, La.	& P. R. R.		
Jackson, Miss.	P.	90.746	297.722	Sibley, La.	P. B. M. 39.	78.099	256.230
Do.	Q.	84.032	275.695	Bayou Dorcheat, La.	P. B. M. 40.	57.687	189.261
Near Pearson, Miss.	R.	85.570	280.741	Doyle, La.	P. B. M. 41.	43.035	141.191
Greenfield, Miss.	S.	94.871	311.256	Haughton, La.	P. B. M. 42.	68.123	223.500
Brandon, Miss.	T.	121.029	397.076	Bodeau, La.	P. B. M. 43.	72.246	237.027
Rankin, Miss.	U.	128.864	422.781	Shreveport, La.	P. B. M. 44.	62.172	203.976
Pelatchie, Miss.	W.	109.416	358.976	Near Shreveport, La.	P. B. M. 46.	59.739	195.994
Near Clarksburg, Miss.	X.	113.323	371.794	Shreveport, La.	P. B. M. 47.	50.029	164.137
Morton, Miss.	Y.	138.583	454.568	Do.	T. B. M. 116a.	56.845	186.499
Forest, Miss.	Z.	146.704	481.311	Mark for barometer.		60.739	199.275
Lake, Miss.	A1.	137.706	451.790	Bayou Pierre B. M. 2.		55.488	182.047
Newton, Miss.	B1.	129.384	424.487	T. B. M. 121=Δ148.		51.188	167.939
Hickory, Miss.	C1.	99.389	326.079	Do.	P. B. M. 48.	48.119	157.870
Chunky, Miss.	D1.	94.111	311.892	On Cash Plantation, La.	P. B. M. 49.	46.485	152.510
				Caspiana Landing, La.	P. B. M. 50.	45.220	148.359
				On Campo Bello Plantation, La.	P. B. M. 51.	44.700	146.653
				On Bonner's Plantation, La.	P. B. M. 52.	43.960	144.225
				Near Howard, La.	P. B. M. 53.	43.155	141.584
				Near Loggy Bayou, La.	P. B. M. 54.	43.896	143.983
				East Point, La.	P. B. M. 55.	† 43.270	141.962
				On Crichton's Plantation, La.	P. B. M. 56.	42.042	137.933
				Do.			
				Coushatta, La.	P. B. M. 57.	40.363	132.424
				Do.	P. B. M. 58.	40.787	133.815
				On Upper Brownsville Plantation, La.	P. B. M. 59.	38.588	126.601

* Destroyed.

† Destroyed. Reported 1903.

‡ Reported destroyed.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Old River, La.	P. B. M. 60.	36.979	121.322	Black River, La.	P. B. M. 3.	15.706	51.529
Near Campti, La.	P. B. M. 61.	* 36.250	118.930	Frogmore, La.	P. B. M. 2.	17.298	56.752
Near Willow, La.	P. B. M. 62.	36.323	119.170	Concordia, La.	T. B. M. 9.	19.790	64.932
Near Tiger Island, La.	P. B. M. 63.	34.422	112.933	Vidalia, La.	M. R. C. Stone 41.	17.781	58.336
St. Maurice, La.	P. B. M. 64.	32.864	107.821	Do.	B. M. 1838.	19.676	64.554
Near Dunns Landing, La.	P. B. M. 65.	31.900	104.875	Do.	B. M. C. H. Pedestal.	20.334	66.712
Near Montgomery, La.	P. B. M. 66.	30.266	99.289	Natchez, Miss.	B. M. Polk 1.	23.478	77.027
Buxtons Landing, La.	P. B. M. 67.	28.149	92.352	Do.	B. M. Polk 2.	25.134	82.457
Near Colfax, La.	P. B. M. 68.	26.425	86.696	Do.	B. M. Polk 3.	12.390	40.650
Colfax, La.	P. B. M. 69.	29.347	96.283	Do.	B. M. cor. State and Broadway sts.	59.433	194.996
Near Fairmount, La.	P. B. M. 70.	28.847	94.642	Do.	B. M. No. 7 (Melvin, 1879).	65.890	216.076
Boyce, La.	P. B. M. 71.	26.191	85.928	Burke, La.	P. B. M. Burke.	23.170	76.017
Near Rapides, La.	P. B. M. 72.	23.931	78.514	Archibald, La.	P. B. M. Archibald.	23.548	77.257
Alexandria, La.	P. B. M. 73.	22.479	73.750	Mangham, La.	P. B. M. Mangham.	22.806	75.020
Do.	P. B. M. 74.	21.632	70.971	Big Creek, La.	P. B. M. Big Creek.	22.734	74.783
Do.	B. M. 3 (Merrill, 1871).	24.312	79.764	Baskin, La.	P. B. M. Baskin.	22.690	74.147
Do.	B. M. 4 (Merrill, 1871).	24.050	78.904	Steeles Switch, La.	P. B. M. Steele.	22.139	72.634
Near Alexandria, La.	P. B. M. 75.	22.109	72.536	Winnboro, La.	P. B. M. Winnboro.	22.111	72.543
Near Grand Bend, La.	P. B. M. 76.	21.680	71.128	Eden, La.	P. B. M. Eden.	21.967	72.070
Near Jones Quarter Land- ing, La.	P. B. M. 77.	20.219	66.335	Gilbert, La.	P. B. M. Gilbert.	21.823	71.556
Near Poland, La.	P. B. M. 78.	18.555	60.876	Wisner, La.	P. B. M. Wisner.	22.008	75.157
Near Egg Bend Ldg., La.	T. B. M. 23—A362.	19.373	63.900	Elam, La.	P. B. M. Elam.	22.136	72.625
Egg Bend Landing, La.	P. B. M. 79.	† 18.750	61.516	Peck, La.	P. B. M. Peck.	22.924	75.210
David Ferry, La.	P. B. M. 80.	59.229	66.308	Near Peck, La.	P. B. M. Newman.	21.892	71.824
Normands Landing, La.	P. B. M. 81.	18.757	61.539	Near Florence, La.	P. B. M. Chisum.	21.994	72.159
Do.	P. B. M. 82.	18.839	61.808	Florence, La.	P. B. M. Florence.	22.188	72.795
Near Barbin Landing, La.	T. B. M. 53.	24.179	79.327	Copeland, La.	P. B. M. Copeland.	19.655	64.485
Marksville, La.	P. B. M. 83.	26.675	87.516	Kirks Ferry, La.	P. B. M. Kirk.	19.229	63.384
Mansura, La.	P. B. M. 84.	23.233	76.420	Greenville, La.	P. B. M. Tensas.	19.786	64.915
Do.	P. B. M. 85.	24.287	79.682	Lee Bayou, La.	P. B. M. Lee Bayou.	19.454	63.825
Moreauville, La.	P. B. M. 86.	18.668	61.247	Clayton, La.	P. B. M. Clayton.	18.828	61.772
Hamburg, La.	P. B. M. 87.	16.972	55.632	Cypress City, La.	P. B. M. Cypress.	17.886	58.681
Near Simmesport, La.	P. B. M. 88.	15.391	50.495	Helena, La.	P. B. M. Helena.	18.544	60.840
Simmesport, La.	P. B. M. 89.	12.784	41.942	Concordia, La.	P. B. M. Concordia.	18.523	60.771
Near Water Valley Land- ing, La.	P. B. M. 90.	13.011	42.687	Do.	B. M. 384.	20.912	68.609
Near Merriek, La.	P. B. M. 91.	13.576	44.541	Osbornes Ferry, La.	P. R. P. Osborne.	23.954	78.589
Near Barbre Landing, La.	P. B. M. 92.	13.657	44.805	New Light, La.	P. B. M. New Light.	21.985	72.129
Do.	P. B. M. 93.	15.161	49.741	Alto, La.	P. R. P. Alto.	22.670	74.376
Do.	P. B. M. 94.	15.362	50.400	Near Charleville, La.	P. B. M. Harland.	22.639	74.275
Near Smithland, La.	M. R. C. 41.	14.181	46.525	Do.	P. A. P. Stokes.	22.153	72.680
Delhi, La.	T. B. M. 1.	29.489	96.748	Do.	P. R. P. Stokes.	22.202	72.841
Near Pullaway Landing, La.	P. B. M. Griffin.	26.640	87.401	Holly Grove Landing, La.	P. R. P. Hatch.	21.503	70.548
Sunrise Landing, La.	P. R. P. Newcomer.	28.114	92.237	Near Holly Grove, La.	P. R. P. Noble 2.	20.727	68.002
Near Crowville, La.	P. B. M. Gray.	23.050	75.623	Near Landerneau, La.	P. R. P. Elmore.	20.368	66.824
Albany Point, La.	P. B. M. 1.	68.006	223.116	Do.	P. R. P. Doucier.	20.976	68.819
Hendersons Mill, La.	P. B. M. 2.	74.554	244.599	Near Bouff River, La.	P. R. P. Harris.	19.943	65.430
Mooringsport, La.	P. B. M. 3.	55.895	183.382	Do.	P. R. P. Wheeler.	19.973	65.528
Jeters Landing, La.	P. B. M. 4.	60.197	197.496	Do.	P. R. P. Herbert.	19.178	62.920
Monroe, La.	B. M. C. (Burrowes, 1883).	24.767	81.256	Do.	P. R. P. La Fourche.	19.008	62.362
Do.	B. M. D. (Burrowes, 1883).	24.614	80.754	Near Columbia, La.	P. R. P. Columbia.	20.955	68.750
Logtown, La.	P. B. M. 9.	21.772	71.430	Do.	P. R. P. Wade.	21.268	69.777
Blankston, La.	P. B. M. 10.	19.688	64.593	Do.	P. R. P. Three Rivers.	16.715	54.839
Near Riverton, La.	T. B. M. 125.	21.708	71.220	Near Bayou Siord, La.	P. R. P. Pargoud.	31.603	103.684
Do.	P. B. M. 11.	19.345	63.468	Bank Smith Place, La.	P. R. P. Zeph.	24.183	79.340
Do.	Gauge B. M. B.	23.509	77.129	Rock Row Shoals, La.	P. R. P. Rock Row.	23.455	76.952
Riverton, La.	Gauge B. M. A.	17.248	56.588	Near Glendora, La.	P. R. P. Glendora.	24.832	81.470
Columbia, La.	P. M. M. 12.	18.794	61.680	Parkeville, La.	P. R. P. Parkeville.	23.664	77.638
Near Columbia, La.	T. B. M. 137.	18.279	59.970	Near Mill Bayou, La.	P. R. P. Cashill.	21.875	71.768
Gibeons Landing, La.	P. R. P. Gibson.	18.766	61.568	Near Fishtrap Shoals, La.	P. R. P. Fishtrap.	21.302	69.888
Coles Landing, La.	P. B. M. 13.	18.557	60.882	Alabama Landing, La.	P. R. P. Alabama.	21.292	69.856
Cottingham Landing, La.	P. B. M. 14.	17.732	58.176	Frank Pierre Creek, La.	P. R. P. Frank Pierre.	17.131	56.204
Danville, La.	B. M. B.	18.451	60.535	Near Shiloh Shoals, La.	P. R. P. Shiloh.	17.381	57.024
Near Danville, La.	B. M. A.	18.362	60.213	Near Lake Landing, Ark.	P. R. P. Lake.	18.096	59.370
Stafford, La.	P. B. M. 8.	17.277	56.683	Near Bayou Lapile, Ark.	P. R. P. Lapile.	18.818	61.739
Catahoula Shoals, La.	P. B. M. 7.	17.529	57.510	Near Ouachita Belle Land- ing, Ark.	P. R. P. Belle Point.	19.698	64.626
Harrisonburg, La.	T. B. M. H.	18.476	60.617	Near Belle Point Landing, Ark.	T. B. M. 39.	20.794	68.222
Do.	B. M. V.	20.633	67.693	Near Eutaw Shoals, Ark.	P. R. P. Eutaw.	22.167	72.726
Do.	P. B. M. 6.	24.199	79.393	Near Jacks Island, Ark.	P. R. P. Jacks Island.	23.583	78.310
Trinity, La.	P. B. M. 5.	16.441	53.940	Careyville Landing, Ark.	P. R. P. Careyville.	25.106	82.369
Jonesville, La.	P. B. M. 4.	16.561	54.334	Pigeon Hill Landing, Ark.	P. R. P. Pigeon Hill.	27.905	91.552
Jones Bayou, La.	P. B. M. 5a.	18.057	59.242	Near Fletchers Landing, Ark.	P. R. P. Fletcher.	23.800	84.675
McClures Landing, La.	P. B. M. 6a.	17.094	56.083	Near Franklin Bayou, Ark.	P. R. P. Franklin.	22.736	74.593
Eva, La.	P. B. M. 7a.	16.432	53.911	Near Champagnolle, Ark.	P. R. P. Bell Field.	24.757	81.224
Hardscramble Landing, La.	P. B. M. 8a.	16.631	54.564	Champagnolle Landing, Ark.	P. R. P. Champag- nolle.	24.802	97.775
Lums, La.	P. B. M. 9a.	16.035	52.608	El Dorado Landing, Ark.	P. R. P. El Dorado.	26.915	88.304
New Era, La.	P. B. M. 10a.	15.947	52.319	Near Smackover Crk, Ark.	P. R. P. Smackover.	26.476	86.863
Acme, La.	P. B. M. 11a.	15.408	50.531	Leppards Camp, Ark.	P. R. P. Leppard.	27.676	90.800
Near Acme, La.	Discharge Jar.	15.569	51.079	Near Little Bay, Ark.	P. R. P. Little Bay.	27.677	90.804
Do.	P. B. M. 12a.	15.030	49.311	Near Beech Hill, Ark.	P. R. P. Beech Hill.	28.419	93.336
Near Murrays Landing, La.	P. B. M. White.	16.603	54.472	Near Walnut Hill, Ark.	P. R. P. Walnut Hill.	27.632	90.656
Barbin Landing, La.	P. B. M. Barbin.	17.673	57.982	Do.	T. B. M. 5.	31.749	104.163

* Reported destroyed, 1992.

† Destroyed.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Frenchport, Ark.....	P. R. P. Frenchport II.	37.605	123.376	Near Vanceville, La.....	Red River Survey, P. R. P. 32	55.518	182.145
Do.....	P. R. P. Frenchport I.	34.865	114.386	Near Shreveport, La.....	P. B. M. 45.....	52.272	171.496
Elliott, Ark.....	P. R. P. Elliott.....	77.550	254.429	Shreveport, La.....	B. M. "B. P.".....	56.918	186.738
Camden, Ark.....	Gauge B. M. A. (Ewens, 1890).	40.810	133.891	Parkeville, La.....	T. B. M. 74.....	24.886	81.647
Near Camden, Ark.....	P. B. M. Camden IV.	35.184	115.433	On Bayou Bartholomew, La.	P. B. M. Sandidge.....	27.277	89.491
Camden, Ark.....	P. B. M. Camden III.	32.933	108.048	Do.....	P. B. M. Myers.....	27.762	91.082
Do.....	P. B. M. Camden II.	60.870	199.704	Do.....	P. B. M. Williams.....	26.525	87.024
Do.....	P. B. M. Camden I.	42.338	138.904	Do.....	P. B. M. Anderson.....	27.618	90.610
Lester, Ark.....	P. B. M. Lester.....	34.793	114.150	Do.....	P. B. M. Bonner.....	28.092	92.165
Chidester, Ark.....	P. B. M. Chidester.....	70.333	230.751	Do.....	P. B. M. Davis No. 2.	29.288	96.089
Little Missouri River, Ark.	P. B. M. Little Missouri.	50.651	166.177	On Bayou Bartholomew, Ark.	P. B. M. Noble.....	34.800	114.173
Whelen, Ark.....	P. B. M. Whelen.....	77.038	252.749	Wards Ferry, La.....	P. B. M. Ward.....	29.713	97.483
Gurdon, Ark.....	P. B. M. Gurdon II.	63.621	208.730	Near Bayou Bartholomew, La.	P. B. M. Wells.....	30.573	100.305
Do.....	P. B. M. Gurdon I.	63.773	209.228	Mound Landing, La.....	P. B. M. Mound.....	31.299	102.687
Near Smithton, Ark.....	P. B. M. Smithton.....	62.981	206.630	Lindgrove Landing, La.	P. B. M. Lindgrove.....	32.318	106.030
Curtis, Ark.....	P. B. M. Curtis.....	56.540	185.498	Bonita, La.....	P. B. M. Bonita.....	32.524	106.706
Gum Springs, Ark.....	P. B. M. Gum Springs	65.319	214.301	Jones, La.....	P. B. M. Jones.....	32.647	107.109
Arkadelphia, Ark.....	P. B. M. Arkadelphia II.	66.018	216.594	Near Jones, La.....	P. B. M. Louisiana-Arkansas.	32.759	107.477
Do.....	P. B. M. Arkadelphia I.	57.525	188.730	Wilnot, Ark.....	P. B. M. Wilnot.....	34.982	114.770
Near Arkadelphia, Ark....	Gauge B. M. B. (Ewens, 189-).	56.872	186.588	Parkdale, Ark.....	P. B. M. Parkdale.....	35.609	116.827
Do.....	P. B. M. Ouachita River.	59.527	195.298	Sunshine, Ark.....	P. B. M. Sunshine.....	36.082	118.379
Daleville, Ark.....	P. B. M. Daleville.....	57.123	187.411	Portland, Ark.....	P. B. M. Portland.....	38.972	127.861
Donaldson, Ark.....	P. B. M. Donaldson.....	69.748	228.832	Kidds Spur, Ark.....	P. B. M. Kidd.....	37.994	124.652
Malvern, Ark.....	P. B. M. Malvern.....	82.640	271.128	Morrell, Ark.....	P. B. M. Morrell.....	39.783	130.521
Traskwood, Ark.....	P. B. M. Traskwood.....	89.106	292.342	Hudspeth, Ark.....	P. B. M. Hudspeth.....	40.648	133.359
Saline River, Ark.....	P. B. M. Saline River.	86.186	282.762	Dermott, Ark.....	P. B. M. Dermott.....	42.799	140.416
Benton, Ark.....	P. B. M. Benton.....	91.075	298.862	Baxter, Ark.....	P. B. M. Baxter.....	43.332	142.165
Alexander, Ark.....	P. B. M. Alexander.....	99.572	326.679	McGehee, Ark.....	G.....	45.720	150.000
Mabelvale, Ark.....	P. B. M. Mabelvale.....	94.635	310.482	Do.....	P. B. M. McGehee.....	45.398	148.943
Ensign, Ark.....	P. B. M. Ensign.....	89.328	293.726	Trippie Junction, Ark.....	P. B. M. Trippie.....	44.182	144.954
Little Rock, Ark.....	T. B. M. 2.....	83.220	263.287	Do.....	T. B. M. 117=Levee B. M.	44.197	145.003
Do.....	B. M. Whittemore.....	89.462	263.982	Near Arkansas City, Ark.....	M. R. C. Stone ³ / ₄	41.592	136.456
Do.....	B. M. Abert.....	75.260	246.916	Near Wilkersons Landing, Miss.	M. R. C. Stone ¹ / ₄	44.276	145.262
Do.....	B. M. Merrill.....	78.096	256.236	Near Port Anderson, Miss..	T. B. M. 121=Levee Board B. M.	44.210	145.046
Do.....	S. S. Gauge B. M.	75.959	249.209	Millers Bend, Miss.....	P. B. M. Millers Bend	38.802	127.303
Do.....	B. M. State House Steps.	87.922	288.457	Greenville, Miss.....	B. M. O.....	38.227	125.416
Do.....	Gauge B. M. A. (Ewens).	73.870	242.355	Vicksburg, Miss.....	P. B. M. 1.....	31.488	103.307
Do.....	B. M. 1 (Ewens, 1887)	72.104	236.561	Near Vicksburg, Miss.....	P. B. M. 2.....	29.559	96.978
Do.....	No. 6 (Gauge B. M.)..	83.196	263.116	Do.....	T. B. M. 11.....	29.261	96.000
Glendora, La.....	T. B. M. 79.....	26.158	85.820	On Belle Isle Plantation, Miss.	P. B. M. 6.....	28.516	93.556
Port Union Landing, La.....	P. B. M. Port Union.	25.897	84.964	On Blakely Plantation, Miss.	P. B. M. 3.....	34.547	113.343
Near Port Union Landing, La.	P. B. M. Hay.....	41.321	135.567	Yazoo River, Miss.....	P. B. M. 4.....	28.828	94.580
Near Farmerville, La.....	P. B. M. White.....	54.694	179.442	Do.....	P. B. M. 5.....	32.252	105.813
Do.....	P. B. M. Rogers.....	53.574	175.767	Calmar, Miss.....	P. B. M. 7.....	31.164	102.244
Farmerville, La.....	P. B. M. Farmerville	54.820	179.855	Near L'Argent, Miss.....	P. B. M. 8.....	28.921	94.885
Scotts Bluff, La.....	P. B. M. Scott.....	23.239	76.243	L'Argent, Miss.....	P. B. M. 9.....	26.980	88.517
Steins Bluff, La.....	P. B. M. Stein.....	29.259	96.078	Sataria, Miss.....	P. B. M. 10.....	29.752	97.611
Near Bayou D'Arbonne, La.	P. B. M. Cox Ferry..	21.634	70.978	Enola, Miss.....	P. B. M. 11.....	30.405	99.754
Buena Vista, Ark.....	H. S. 287.....	87.783	288.001	Yazoo City, Miss.....	P. B. M. 12.....	35.872	117.690
Do.....	P. B. M. Buena Vista	86.135	282.595	Do.....	P. B. M. 13.....	31.330	102.789
Near Ogamaw, Ark.....	R. R. B. M.....	57.688	189.265	Bee Lake, Miss.....	P. B. M. 20.....	32.930	108.038
Stephens, Ark.....	P. B. M. Stephens.....	71.949	236.053	Tehuila, Miss.....	P. B. M. 28.....	36.074	118.353
Near Stephens, Ark.....	R. R. B. M.....	56.252	184.553	Do.....	P. B. M. 27.....	34.912	114.540
McNeil, Ark.....	P. B. M. McNeil.....	98.357	322.693	Sidon, Miss.....	P. B. M. 26.....	37.347	122.529
Waldo, Ark.....	P. B. M. Waldo.....	107.419	352.424	Greenwood, Miss.....	P. B. M. 25.....	38.215	125.387
Near Buckner, Ark.....	R. R. B. M.....	75.571	247.936	Do.....	P. B. M. 24.....	39.414	129.311
Stamps, Ark.....	P. B. M. Stamp.....	81.563	267.595	Fort Loring, Miss.....	P. B. M. 23.....	41.026	134.599
New Lewisville, Ark.....	P. B. M. Lewisville..	79.323	260.246	Do.....	P. B. M. 22.....	39.168	128.504
Lewisville, Ark.....	T. B. M. 239.....	83.880	275.196	Itta Bena, Miss.....	P. B. M. 21.....	38.156	125.183
Garland, Ark.....	P. B. M. Garland.....	70.652	231.797	Near Baird, Miss.....	P. B. M. 20.....	35.770	117.355
Do.....	Red River Survey, B. M. 4.	70.439	231.099	Do.....	P. B. M. 19.....	35.042	114.967
Jordan Ferry, Ark.....	P. B. M. Jordan.....	65.815	215.928	Do.....	P. B. M. 18.....	38.587	126.598
Jordan Landing, Ark.....	Red River Survey, P. R. P. 14.	65.908	216.233	Indianola, Miss.....	P. B. M. 17.....	35.854	117.631
Canfield, Ark.....	P. B. M. Canfield.....	78.953	259.092	Heathman, Miss.....	P. B. M. 16.....	37.062	121.594
Bradley, Ark.....	P. B. M. Bradley.....	77.075	252.870	The Bogue, Miss.....	P. B. M. 15.....	35.053	115.003
Millers Bluff, La.....	P. B. M. Lusk.....	69.964	229.540	Stoneville, Miss.....	P. B. M. 14.....	37.341	122.510
Near Millers Bluff, La.....	Red River Survey, P. R. P. 25.	60.550	198.654	Greenville, Miss.....	Greenville North Base.	38.473	126.223
Plain Dealing, La.....	P. B. M. Plain Dealing.	79.497	260.814	Near Argyle, Miss.....	P. B. M. 88.....	38.223	125.403
Alden Bridge, La.....	P. B. M. Alden Bridge	65.814	215.925	Millers Bend, Miss.....	P. B. M. 87.....	39.515	129.642
Hurricane Bluff, La.....	P. B. M. Hurricane Bluff.	58.493	191.906	Near Ofruits Landing, Miss	P. B. M. 86.....	41.267	135.390
Near Hurricane Bluff, La..	Red River Survey, P. R. P. 30C.	69.863	229.379	Port Anderson, Miss.....	P. B. M. 85.....	41.748	136.968
Benton, La.....	P. B. M. Benton.....	64.152	210.472	Wilkersons Landing, Miss.	P. B. M. 84.....	*42.391	139.078
Near Vanceville, La.....	T. B. M. 274.....	54.318	178.208	Near Wilkersons Landing, Miss.	P. B. M. 83.....	42.434	139.219
				Mound Place, Miss.....	P. B. M. 82.....	42.365	138.993
				Childers, Miss.....	P. B. M. 81.....	42.811	140.456

*Reported destroyed, 1897.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Content, Miss.	P. B. M. 80.	43.677	143.297	Carrollton, La.	(B. M. A (Ewens 1892)	1.863	6.112
Rueck Ridge, Miss.	P. B. M. 79.	43.240	141.863		(Top of cap over same	3.108	10.197
Bolivar, Miss.	P. B. M. 78.	42.992	141.050		(B. M. 241.	0.150	0.492
Stormville, Miss.	P. B. M. 77.	43.360	142.257	Do.	(Top of cap over same	1.354	4.442
Nebletts Landing, Miss.	P. B. M. 76.	44.340	145.472		(B. M. 242.	0.022	0.072
Near Prentiss, Miss.	P. B. M. 75.	45.384	148.897	Near Kenner, La.	(Top of cap over same	1.214	3.983
Do.	P. B. M. 74.	45.200	148.520	On Patterson Plantation, La.	(Top of cap over same	0.967	3.173
Do.	P. B. M. 73.	44.777	146.006		(B. M. 243.	2.176	7.139
Near Clarks Landing, Miss.	P. B. M. 72.	45.268	148.517	On Pecan Grove Plantation, La.	(Top of cap over same	1.978	6.480
Near Beulah, Miss.	P. B. M. 71.	44.605	146.342		(Top of cap over same	3.176	10.420
Riverton, Miss.	P. B. M. 70.	45.881	150.528	Near St. Rose, La.	P. B. M. V.	4.615	15.141
Rosedale, Miss.	P. B. M. 69.	46.237	151.696	Near Hahnville, La.	P. B. M. VI.	4.173	13.691
Do.	P. B. M. 68.	44.832	147.086		(B. M. 244.	0.472	1.549
Near Terrene, Miss.	P. B. M. 67.	47.312	155.223	Near Sarpy, La.	(Top of cap over same	1.678	5.505
Near Concordia, Miss.	P. B. M. 66.	47.268	155.078		P. B. M. VII.	4.816	15.800
Concordia, Miss.	P. B. M. 65.	48.278	158.392	Near Sellers, La.	(B. M. 245.	4.178	13.707
Carsons, Miss.	P. B. M. 64.	49.210	161.450		(Top of cap over same	5.386	17.671
Near Australia, Miss.	P. B. M. 63.	49.446	162.224	Near La Place, La.	(B. M. 246.	3.023	9.918
Lake Charles Landing, Miss.	P. B. M. 62.	50.545	165.830		(Top of cap over same	4.225	13.862
Robinsonville, Miss.	P. B. M. 61.	49.403	162.083	Near Garyville, La.	(B. M. 247.	3.358	11.017
Near Sunflower Landing, Miss.	P. B. M. 60.	51.395	168.618		(Top of cap over same	4.568	14.987
				Mount Airy, La.	Δ Chenet.	3.234	10.610
Near Hughes Landing, Miss.	P. B. M. 59.	53.078	174.140	Do.	P. B. M. X.	5.554	18.222
Do.	P. B. M. 58.	52.384	171.863	Near Lutcher, La.	(B. M. 248.	2.221	7.287
Near Friar Point, Miss.	P. B. M. 57.	52.289	171.551	Do.	(Top of cap over same	3.435	11.270
Friar Point, Miss.	P. B. M. Friar Point II.	55.276	181.351	Do.	T. B. M. 83.	4.023	13.199
Do.	P. B. M. Friar Point I.	55.905	183.415		(B. M. 249.	3.217	10.554
				Do.	(Top of cap over same	4.429	14.531
Near Friar Point, Miss.	P. B. M. Delta.	54.777	179.714	Near Hester, La.	(B. M. 250.	3.468	11.378
Glendale, Miss.	P. B. M. Glendale.	56.336	184.829	Do.	(Top of cap over same	4.688	15.381
Helena, Ark.	P. B. M. Helena I.	58.615	192.306	Do.	T. B. M. 71.	4.762	15.623
Do.	P. B. M. Helena II.	58.622	192.329	Do.	P. B. M. XII.	5.843	19.170
Near Austin, Miss.	P. B. M. Trotters Landing.	56.447	185.193	Do.	Δ Homestead.	4.924	16.155
Austin, Miss.	P. B. M. Austin I.	60.004	196.863		P. B. M. XIII.	7.866	25.807
Do.	P. B. M. Austin II.	59.331	194.655	Near College Landing, La.	(B. M. 251.	5.066	16.621
Mhoons Landing, Miss.	P. B. M. Mhoons Landing.	59.333	194.662		(Top of cap over same	6.275	20.587
Commerce, Miss.	P. B. M. Commerce.	60.051	197.017	Near Convent, La.	P. B. M. XIV.	7.280	23.884
Star Landing, Miss.	P. B. M. Star Landing.	63.121	207.089	On Celestine Plantation.	(B. M. 252.	3.245	10.646
Horn Lake Creek, Miss.	P. B. M. Horn Lake Creek.	67.239	220.600		(Top of cap over same	4.454	14.613
Friar Point, Miss.	P. B. M. Friar Point III.	53.821	176.578	Colomb, La.	P. B. M. XV.	7.128	23.386
Coahoma, Miss.	P. B. M. Coahoma.	54.247	177.975	Near Whitehall, La.	(B. M. 253.	5.000	16.404
Near Clover Hill, Miss.	P. B. M. Clover Hill.	52.861	173.428		(Top of cap over same	6.206	20.361
Lyon, Miss.	P. B. M. Lyon.	53.024	173.963	Near Miles, La.	(B. M. 254.	3.254	10.676
Clarksdale, Miss.	P. B. M. Clarksdale I.	52.976	173.805	Near Burnside, La.	(Top of cap over same	4.462	14.639
Do.	P. B. M. Clarksdale II.	52.598	172.565		P. B. M. XVI.	7.549	24.767
Near Clarksdale, Miss.	P. B. M. Clarksdale III.	52.713	172.943	Near Belle Helene, La.	(B. M. 255.	6.141	20.148
					(Top of pipe over same	7.661	25.134
Near Ocean Springs, Miss.	(P. B. M. Keenor.	5.516	18.097	New River, La.	(P. B. M. New River.	6.222	20.413
	(Top of cap over same	6.730	22.080		(Top of cap over same	7.433	20.386
Near Biloxi, Miss.	Biloxi Gauge B.	1.098	5.571	Near Geismar, La.	P. B. M. XX.	7.179	23.553
Do.	P. B. M. 19A.	1.736	5.696	St. Gabriel, La.	(P. B. M. St. Gabriel.	5.457	17.904
Biloxi, Miss.	T. B. M. 184.	5.362	17.592		(Top of cap over same	6.665	21.867
Do.	P. B. M. City Hall.	7.023	23.041	Near Sunshine, La.	T. B. M. 22.	7.761	25.463
Do.	T. B. M. 183.	7.186	23.576	Do.	P. B. M. XXIV.	7.922	25.991
Do.	T. B. M. 186.	7.256	23.806	Do.	(B. M. 256.	7.826	25.676
Do.	(P. B. M. Hygeia.	6.508	21.352	Near Burtville, La.	(B. M. 257.	5.930	19.455
	(Top of cap over same	7.721	25.331		(P. B. M. XXIX.	8.405	27.575
Beauvoir, Miss.	P. B. M. 17.	7.864	25.800	Near Baton Rouge, La.	(Top of cap over same	9.623	31.571
Mississippi City, Miss.	P. B. M. 16.	6.360	20.866	Do.	P. B. M. XXXVIII.	9.282	30.453
White Harbor, Miss.	P. B. M. 14.	9.406	30.860	Do.	P. B. M. XXX.	8.943	29.340
Pass Christian, Miss.	P. B. M. 13.	3.368	11.050	Baton Rouge, La.	P. B. M. City Limits.	9.307	30.535
Bay St. Louis, Miss.	P. B. M. 11.	6.520	21.391	Do.	U. S. E. 2.	10.462	34.324
Do.	P. B. M. 10.	7.172	23.530	Do.	T. B. M. 1.	18.407	60.390
Waveland, Miss.	P. B. M. 9.	4.722	15.492	Do.	P. B. M. XXXI.	18.943	62.149
Chinchuba, Miss.	P. B. M. 8.	2.958	9.705	Do.	P. B. M. Barracks.	17.825	58.481
Clairborne, Miss.	P. B. M. 7.	1.267	4.157	Do.	T. B. M. 2.	17.143	56.243
Near Clairborne, Miss.	P. B. M. 6.	3.133	10.279	Do.	P. B. M. Post Office.	18.000	59.055
Fort Macomb, Chef Menteur, La.	P. B. M. 4.	2.221	7.287		(P. B. M. North Boulevard.	18.857	52.024
New Orleans, La.	T. B. M. 95.	1.159	3.802		(Top of cap over same	17.061	55.974
Do.	P. B. M. 41.	0.169	0.554	West Baton Rouge, La.	P. B. M. XXXII.	8.617	28.271
Do.	P. B. M. 3.	1.307	4.288	Near West Baton Rouge, La.	T. B. M. 90.	8.763	28.750
Do.	T. B. M. 175.	0.642	2.106	Do.	T. B. M. 89.	9.381	30.777
Do.	P. B. M. 2.	2.795	9.170	Do.	T. B. M. 88.	9.433	30.948
Do.	Halfway House.	1.635	5.364	Do.	(B. M. 258.	9.920	32.546
Do.	City Stone XXMR.	1.468	4.816		(P. B. M. Poplar Grove.	8.593	28.192
Do.	City Park.	1.472	4.829		(Top of cap over same	9.810	32.185
Do.	P. B. M. 24A.	0.129	0.423	Do.	T. B. M. 87.	9.480	31.102
Do.	P. B. M. 24A.	1.329	4.360	Near Lobdell, La.	T. B. M. 85.	9.216	30.236
Do.	T. B. M. 170.	2.845	9.334	Do.	T. B. M. 84.	9.253	30.358
Carrollton, La.	City Stone XXMB.	1.404	4.606	Do.	(B. M. 259.	7.463	24.485
Do.	T. B. M. 160.	1.908	6.260		(Top of cap over same	9.009	29.557
Do.	P. B. M. Carrollton.	2.730	8.957	Lobdell, La.	P. B. M. XXXIII.	9.325	30.594
				Do.	T. B. M. 83.	9.677	31.749
				Do.	T. B. M. 82.	8.926	29.285
				Near Lobdell, La.	T. B. M. 80.	8.311	27.267
				Do.	(P. B. M. Allendale.	7.774	25.528
					(Top of cap over same	8.983	29.472
				Near Devall, La.	P. B. M. XXXIV.	9.554	31.345
				Do.	T. B. M. 75.	10.135	33.251
				Do.	T. B. M. 74.	9.952	32.651
				Do.	(P. B. M. Solitude.	8.985	29.478
				Do.	(Top of cap over same	10.188	33.425
				Do.	T. B. M. 73.	9.887	32.438

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Devall, La.	T. B. M. 72.	9.278	30.440	Near Fairview, La.	/P. B. M. Jones.	14.204	46.601
Near Walls, La.	T. B. M. 70.	9.396	30.827	(Top of cap over same)		15.418	50.584
Do.	B. M. 143.	9.229	30.279	Near Fish Pond, La.	T. B. M. 42.	16.043	52.634
Arbroth, La.	P. B. M. XXXV.	10.500	34.449	Do.	/P. B. M. Fish Pond.	16.348	53.635
Near Arbroth, La.	T. B. M. 65.	11.079	36.348	Do.	(Top of cap over same)	17.568	57.638
Near Hermitage, La.	B. M. 144.	11.150	36.581	Do.	T. B. M. 50.	16.942	55.584
Do.	T. B. M. 64.	10.286	33.747	Do.	/P. B. M. Hedge.	16.022	52.566
Hermitage, La.	P. B. M. XXXVI.	11.517	37.785	Do.	(Top of cap over same)	17.239	56.558
Near Hermitage, La.	T. B. M. 63.	10.687	35.062	Near Morville, La.	B. M. 145.	19.016	62.388
Near Anchor, La.	T. B. M. 61.	11.565	37.943	Do.	/P. B. M. Yeager.	17.636	57.861
Do.	B. M. 143.	11.522	37.802	Do.	(Top of cap over same)	18.857	61.867
Do.	P. B. M. XXXVII.	13.722	45.020	Do.	/B. M. 143.	15.929	52.260
Do.	T. B. M. 59.	11.629	38.153	(Top of cap over same)		17.150	56.266
Near Bayou Sara, La.	T. B. M. 58.	11.829	38.809	Near Vidalia, La.	T. B. M. 61.	18.846	61.831
Do.	T. B. M. 57.	12.179	39.957	Do.	/P. B. M. Lucerna.	17.880	58.661
Do.	T. B. M. 56.	11.895	39.020	Do.	(Top of cap over same)	19.091	62.634
Do.	P. B. M. XXXVIII.	12.035	39.485	Do.	T. B. M. 62.	18.849	61.840
Do.	T. B. M. 55.	12.214	40.072	Do.	T. B. M. 63.	17.928	58.819
Do.	P. B. M. XXXIX.	11.940	39.173	Do.	(New B. M. 143.)	18.181	59.649
Do.	B. M. 143.	11.599	38.054	Do.	(Top of cap over same)	19.391	63.619
Do.	T. B. M. 53.	9.799	32.149	Do.	T. B. M. 66.	18.892	61.982
Near Pointe Coupee, La.	/B. M. 143.	9.450	31.004	Do.	Levee B. M. No. 448.	20.245	66.420
Do.	(Top of cap over same)	10.973	36.001	Do.	LXI.	18.874	61.922
Do.	P. B. M. XL.	11.365	37.287	Vidalia, La.	T. B. M. 69.	19.071	62.569
Do.	T. B. M. 50.	12.112	39.737	Do.	LXII.	19.420	63.714
Near Brooks, La.	T. B. M. 49.	12.350	40.518	Do.	LXIII.	18.723	61.427
Do.	P. B. M. XLI.	12.291	40.325	Do.	/B. M. 143.	18.217	59.767
Do.	T. B. M. 47.	12.378	40.610	Do.	(Top of cap over same)	19.771	64.865
Do.	T. B. M. 46.	10.602	34.783	Near Vidalia, La.	T. B. M. 71.	20.099	65.941
Near Morganza, La.	/B. M. 143.	10.707	35.128	Do.	/P. B. M. Waterworks.	20.508	67.283
Do.	(Top of cap over same)	12.258	40.216	Natchez, Miss.	(Top of cap over same)	21.716	71.247
Do.	T. B. M. 43.	16.020	52.559	Do.	B. M. N. (Ewens	21.693	71.171
Do.	T. B. M. 40.	15.633	51.289	Do.	1886).		
Do.	T. B. M. 39.	10.599	34.774	Do.	T. B. M. 77.	21.855	71.703
Do.	B. M. 143.	9.854	32.329	Do.	B. M. 3 (Babbitt	24.587	80.666
Near Racourci, La.	T. B. M. 38.	11.475	37.648	Do.	1874).		
Racourci, La.	T. B. M. 37.	12.039	39.498	Do.	B. M. A. (Ewens	27.706	90.899
Do.	P. B. M. XLIII.	11.818	38.773	Do.	1832).		
Near Racourci, La.	T. B. M. 35.	15.970	52.395	Do.	/P. B. M. 1.	59.601	195.541
Near Lacour, La.	T. B. M. 33.	14.315	46.965	Do.	(Top of cap over same)	60.842	199.612
Near Ennis, La.	P. B. M. XLIV.	13.718	45.006	Near Vidalia, La.	LXIV.	19.862	65.164
Williamsport, La.	T. B. M. 22.	14.889	48.848	Do.	B. M. 143.	19.946	65.440
Near Smithland, La.	T. B. M. 20.	15.111	49.577	Do.	/B. M. 143.	17.457	57.274
Do.	/P. B. M. Smithland.	13.434	44.075	Do.	(Top of cap over same)	18.666	61.240
Smithland, La.	(Top of cap over same)	14.648	48.058	Do.	T. B. M. 84.	19.286	63.274
Near Smithland, La.	P. B. M. XLV.	14.813	48.599	Do.	/P. B. M. Minorca.	18.277	59.964
Do.	T. B. M. 17.	14.385	47.195	Do.	(Top of cap over same)	19.492	63.950
Red River Landing, La.	/Gauge B. M. W.	12.500	41.010	Near Bullitt Bayou, La.	/P. B. M. Sycamore.	18.922	62.080
Do.	(Top of cap over same)	13.740	45.079	Do.	(Top of cap over same)	20.134	66.056
Do.	Gauge B. M. B.	13.867	45.495	Do.	T. B. M. 92.	19.999	65.613
Do.	Gauge B. M. D.	14.943	49.025	Do.	/P. B. M. Vidal.	19.132	62.769
Near Red River Ldg., La.	B. M. 143.	15.932	52.270	Do.	(Top of cap over same)	20.350	66.765
Do.	T. B. M. 13.	13.358	43.825	Do.	T. B. M. 93.	21.063	69.104
Do.	/P. B. M. Carrs Point.	15.946	52.316	Do.	T. B. M. 95.	18.869	61.906
Do.	T. B. M. 9.	14.125	46.342	Do.	/B. M. 143.	17.801	58.402
In Louisiana, opposite	T. B. M. 6.	15.392	50.499	Do.	(Top of cap over same)	19.020	62.401
Tarbert, Miss.				Do.	T. B. M. 96.	19.122	62.736
Near Point Breeze, La.	P. B. M. L.	16.194	53.130	Near Mabel, La.	T. B. M. 98.	20.240	66.404
Do.	T. B. M. 5.	16.384	53.753	Do.	/P. B. M. Vauchuse.	19.534	64.088
Do.	P. B. M. LI.	16.237	53.271	Do.	(Top of cap over same)	20.739	68.041
On Point Breeze, La.	T. B. M. 4-H. W.	15.878	52.093	Do.	/B. M. 143.	18.603	61.033
Do.	Gauge B. M. 49.			Do.	(Top of cap over same)	20.140	66.076
Do.	B. M. 143.	16.612	54.501	Near L'Argent, La.	T. B. M. 103.	20.096	65.932
Near Fort Adams, Miss.	T. B. M. 1.	13.700	44.947	Do.	B. M. 143.	20.078	65.873
Fort Adams, Miss.	P. B. M. XLIX.	20.884	68.517	Do.	T. B. M. 104.	18.193	59.688
				Do.	/P. B. M. Fairchilds	20.642	67.723
				Fairchilds Island, La.	Is.		
Fort Adams, Miss.	/P. B. M. Fort Adams	15.742	51.647	Do.	(Top of cap over same)	21.860	71.719
Near Fort Adams, Miss.	(Top of cap over same)	16.951	55.613	Near Waterproof, La.	B. M. 143.	20.433	67.037
On Point Breeze, La.	XLVIII.	23.995	78.724	Waterproof, La.	LXXI.	20.678	67.841
Near Nocks, La.	/P. B. M. Pt. Breeze.	15.286	50.151	Near Goldman, La.	/P. B. M. Melwood.	21.005	68.914
Do.	(Top of cap over same)	16.496	54.121	Do.	(Top of cap over same)	22.222	72.907
Near Nocks, La.	/P. B. M. Knox.	14.886	48.838	Do.	T. B. M. 114.	25.036	82.139
Do.	(Top of cap over same)	16.102	52.828	Do.	P. B. M. Kempe	19.290	63.287
Near Black Hawk, La.	/P. B. M. Ballymagan.	15.433	50.633	Do.	Bend.		
Do.	(Top of cap over same)	16.648	54.619	Do.	T. B. M. 120.	18.969	62.234
Do.	T. B. M. 13.	16.934	55.558	Do.	/P. B. M. Stackhouse.	18.473	60.607
Do.	T. B. M. 14.	16.668	54.685	Do.	(Top of cap over same)	19.696	64.619
Do.	LIII.	16.019	52.556	In Louisiana, near Rod-	No. 297 or LXXIII.	21.826	71.607
Do.	T. B. M. 15.	16.833	55.226	ney, Miss.			
Do.	T. B. M. 17.	17.401	57.090	Near St. Joseph, La.	B. M. 143.	21.597	70.856
Do.	/P. B. M. Union Point.	16.180	53.084	Do.	/B. M. 143.	20.397	66.919
Do.	(Top of cap over same)	17.396	57.073	Do.	(Top of cap over same)	21.937	71.972
Near Bougere, La.	B. M. 143.	16.971	55.679	Do.	No. 291.	23.383	76.716
Do.	LIV.	17.403	57.096	St. Joseph, La.	B. M. A. (1892).	22.520	73.884
Near Fairview, La.	T. B. M. 31.	17.626	57.828	Do.	/P. B. M. Worrell.	22.152	72.677
Do.	(New B. M. 143.)	16.424	53.884	Do.	(Top of cap over same)	23.370	76.673
Do.	(Top of cap over same)	17.638	57.867	Near Rodney, Miss.	/P. B. M. Woodland.	23.180	76.050
Do.	T. B. M. 32.	17.715	58.120	Do.	(Top of cap over same)	24.399	80.049
Near Arnot, Miss.	T. B. M. 35.	15.858	52.027	St. Joseph, La.	T. B. M. 136.	22.524	73.897
Do.	/P. B. M. Kindling.	14.882	48.825	Do.	/P. B. M. St. Joseph.	21.540	70.669
Do.	(Top of cap over same)	16.099	52.818	Do.	(Top of cap over same)	22.755	74.655
Near Fairview, La.	T. B. M. 36.	17.594	57.723	Near St. Joseph, La.	No. 286.	25.237	82.798
Do.	B. M. 143.	17.624	57.821	Do.	/P. B. M. Bruin.	22.552	73.989
Do.	T. B. M. 38.	16.093	52.798	Do.	(Top of cap over same)	24.399	77.982

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near St. Joseph, La.	T. B. M. 141	24.418	80.111	Near Richardsons Land- ing, Tenn.	P. B. M. 48	73.424	240.892
Do.	(P. B. M. Botany Bay Top of cap oversame	22.234	72.946	Do.	P. B. M. 49	72.202	237.178
Near Hard Times Land- ing, La.	(P. B. M. Winter Quarters.	23.448	76.929	Near Paynes Ldg., Tenn.	P. B. M. 50	72.076	236.469
Do.	Top of cap oversame	21.830	71.621	Near Thomas Ldg., Tenn.	P. B. M. 51	72.106	236.568
Do.	(P. B. M. Hard Times Top of cap oversame	23.045	75.607	Do.	P. B. M. 52	70.757	232.112
Do.	(P. B. M. Hard Times Top of cap oversame	23.895	78.396	Near Brinkleys Ldg., Tenn.	P. B. M. 53	69.101	226.709
Do.	T. B. M. 157	25.102	82.355	Near Island No. 40, Tenn.	P. B. M. 54	68.344	224.225
Do.	No. 272	24.420	80.118	Do.	P. B. M. 55	67.523	221.532
Do.	Top of cap oversame	23.583	77.372	Near Memphis, Tenn.	P. B. M. 56	67.470	221.358
Do.	T. B. M. 161	24.803	81.375				
Do.	Levee B. M. 133	23.392	76.745	Keokuk, Iowa	P. B. M. 1 (1881)	150.462	493.641
Do.	(P. B. M. Bland	24.907	81.716	Do.	P. B. M. 2	150.677	494.346
Near Point Pleasant, La.	Top of cap oversame	22.833	74.911	Do.	P. B. M. 3	155.314	509.359
Do.	T. B. M. 170	24.050	78.904	Near Keokuk, Iowa	P. B. M. 4	152.348	499.828
Do.	(P. B. M. McMillan	24.492	80.354	Alexandria, Mo.	P. B. M. 5	151.932	495.481
Do.	Top of cap oversame	25.062	82.224	Gregory Landing, Mo.	P. B. M. 6	148.692	487.334
Near Ashwood, La.	T. B. M. 175	26.279	86.217	Near Gregory Ldg., Mo.	P. B. M. 7	151.156	495.918
Do.	(P. B. M. Somerset	26.210	85.991	Canton, Mo.	P. B. M. 8	150.706	494.441
Near Ashwood, La.	Top of cap oversame	25.356	83.189	Do.	P. B. M. 9	150.506	493.785
Near King, La.	T. B. M. 176	26.574	87.185	Near La Grange, Mo.	P. B. M. 10	147.532	484.028
Do.	(P. B. M. 180	25.959	85.167	La Grange, Mo.	P. B. M. 11	147.499	483.920
Do.	(P. B. M. Leona	24.417	80.108	West Quincy, Mo.	P. B. M. 12	145.637	477.511
Do.	Top of cap oversame	23.528	77.191	Fabius River, Mo.	P. B. M. 13	145.832	478.450
Do.	T. B. M. 183	24.741	81.171	Near Hilton, Mo.	P. B. M. 14	144.724	474.815
Do.	(P. B. M. Chelula	26.327	86.374	Do.	P. B. M. 15	143.667	471.347
Do.	Top of cap oversame	22.864	75.013	Hannibal, Mo.	P. B. M. 16	149.180	489.435
Do.	(P. B. M. 232	24.078	78.996	Near Hannibal, Mo.	P. B. M. 17	141.716	464.947
Near Griffin, La.	T. B. M. 193	26.780	87.981	Saverton, Mo.	P. B. M. 18	141.294	463.562
Do.	(P. B. M. Griffin	27.294	89.547	Near Ashburn, Mo.	P. B. M. 19	145.663	477.596
Do.	Top of cap oversame	26.326	86.371	Do.	P. B. M. 20	144.488	474.041
Do.	T. B. M. 194	27.546	90.374	Do.	P. B. M. 21	139.117	456.420
Do.	T. B. M. 197	27.288	89.527	Near Louisiana, Mo.	P. B. M. 22	142.891	468.802
Near Delta, La.	(P. B. M. Martin	24.806	81.384	Louisiana, Mo.	P. B. M. 23	142.882	468.772
Delta, La.	Top of cap oversame	25.236	82.795	Do.	P. B. M. 24	142.601	467.850
Do.	Rangestone for SW. Base.	26.454	86.791	Near Louisiana, Mo.	P. B. M. 25	141.192	460.227
Do.	SW. Base	26.460	86.811	Near Clarksville, Mo.	P. B. M. 26	140.557	461.141
Do.	(P. B. M. Delta	26.759	87.792	Clarksville, Mo.	P. B. M. 27	141.927	465.639
Do.	Top of cap oversame	26.376	86.535	Do.	P. B. M. 28	140.470	460.859
Near Delta, La.	N. E. Base	27.597	90.541	In Illinois, opposite Clarks- ville, Mo.	P. B. M. 29	136.793	448.795
Near Vicksburg, Miss.	P. B. M. B.	27.968	91.758	Do.	P. B. M. 30	136.776	448.739
Kleinston, Miss.	M. R. C. 19	30.005	98.441	Do.	P. B. M. 31	135.918	445.924
Do.	P. B. M. Pelican	28.923	88.330	Near Hamburg, Ill.	P. B. M. 32	142.507	467.542
		31.205	102.378	Do.	P. B. M. 33	156.944	514.907
				Do.	P. B. M. 34	135.597	444.871
Cairo, Ill.	P. B. M. 4	95.158	312.198	Do.	P. B. M. 35	133.820	439.041
Do.	P. B. M. 5	95.793	314.281	Near Reds Landing, Ill.	P. B. M. 36	133.566	438.208
Fort Jefferson, Ky.	P. B. M. 6	97.941	321.328	Near Sterling Island, Ill.	P. B. M. 37	133.473	437.903
Columbus, Ky.	P. B. M. 7	96.055	315.140	Near Hogville Landing, Ill.	P. B. M. 38	132.611	435.075
Do.	P. B. M. 8	93.846	307.893	Turners Landing, Ill.	P. B. M. 39	133.478	437.919
Do.	P. B. M. 9	94.384	309.658	Near Turners Landing, Ill.	P. B. M. 40	132.538	434.835
Do.	P. B. M. 10	137.861	452.299	West Point, Ill.	P. B. M. 41	135.868	445.760
Near Worshams Landing, Ky.	P. B. M. 11	93.486	306.712	Near Hastings Landing, Ill.	P. B. M. 42	134.989	442.876
Do.	P. B. M. 12	92.330	302.919	Near Martins Landing, Ill.	P. B. M. 43	132.802	435.701
Near Hickman, Ky.	P. B. M. 13	91.895	301.492	Near Millers Landing, Ill.	P. B. M. 44	132.677	435.291
Hickman, Ky.	P. B. M. 14	109.797	360.226	Thomas Landing, Ill.	P. B. M. 45	130.916	429.514
Do.	P. B. M. 15	94.502	310.045	Near Dixons Landing, Ill.	P. B. M. 46	138.572	454.632
Near Hickman, Ky.	P. B. M. 16	91.740	300.984	Near Point Landing, Ill.	P. B. M. 47	131.736	432.204
Do.	P. B. M. 17	90.662	297.447				
Do.	P. B. M. 18	89.946	295.098	Near Keokuk, Iowa	P. B. M. 1 (1882)	152.879	501.571
Do.	P. B. M. 19	90.280	296.194	Nashville, Iowa	P. B. M. 2	154.815	507.922
Near Lesters Ldg., Tenn.	P. B. M. 20	89.761	294.491	Montrose, Iowa	P. B. M. 3	161.676	530.432
Do.	P. B. M. 21	89.426	293.392	Near Vele Station, Iowa	P. B. M. 4	165.596	543.293
Tiptonville, Tenn.	P. B. M. 22	88.435	290.140	Do.	P. B. M. 5	163.788	537.361
Do.	P. B. M. 23	90.140	295.734	Do.	P. B. M. 6	165.299	542.318
Near Tiptonville, Tenn.	P. B. M. 24	85.376	280.104	Fort Madison, Iowa	P. B. M. 7	162.920	534.513
Do.	P. B. M. 25	85.614	280.885	Do.	P. B. M. 8	164.492	539.671
Near Reelfoot Ldg., Tenn.	P. B. M. 26	84.889	278.234	Near Fort Madison, Iowa	P. B. M. 9	166.420	545.996
Mott Landing, Tenn.	P. B. M. 27	82.462	270.544	Do.	P. B. M. 10	167.054	548.076
Near Booths Point Land- ing, Tenn.	P. B. M. 28	82.353	270.186	Near Burlington, Iowa	P. B. M. 11	164.640	540.156
Near Booths Point, Tenn.	P. B. M. 29	80.330	263.549	Burlington, Iowa	P. B. M. 12	162.097	531.813
Do.	P. B. M. 30	80.230	263.221	Do.	P. B. M. 13	165.329	542.417
Do.	P. B. M. 31	80.453	263.953	Do.	P. B. M. 14	165.367	542.542
Near Hales Point, Tenn.	P. B. M. 32	79.416	260.551	Do.	P. B. M. 15	161.609	530.212
Do.	P. B. M. 33	79.158	259.704	Do.	P. B. M. 16	162.096	531.810
Do.	P. B. M. 34	77.722	254.993	Ogawka, Ill.	P. B. M. 17	163.460	536.285
Near Forked Deer Island, Tenn.	P. B. M. 35	77.940	255.708	Do.	P. B. M. 18	167.071	548.132
Do.				Keithsburg, Ill.	P. B. M. 19	164.562	539.900
Near Ashport, Tenn.	P. B. M. 36	77.635	254.707	Do.	P. B. M. 20	167.585	549.818
Do.	P. B. M. 37	77.560	254.461	Near New Boston, Ill.	P. B. M. 21	169.200	555.117
Do.	P. B. M. 38	76.576	251.233	New Boston, Ill.	P. B. M. 22	173.950	570.701
Near Plum Point, Tenn.	P. B. M. 39	76.064	249.553	Do.	P. B. M. 23	173.950	570.701
Do.	P. B. M. 40	75.411	247.411	Port Louisa, Iowa	P. B. M. 24	166.247	545.429
Near Fort Pillow Landing, Tenn.	P. B. M. 41	77.443	254.078	Near Muscatine, Iowa	P. B. M. 25	165.442	544.428
Near Fulton, Tenn.	P. B. M. 42	91.006	298.576	Do.	P. B. M. 26	167.195	548.539
Do.	P. B. M. 43	75.284	246.994	Muscatine, Iowa	P. B. M. 27	167.779	550.455
Near Randolph, Tenn.	P. B. M. 44	74.269	243.664	Do.	P. B. M. 28	168.239	551.964
Do.	P. B. M. 45	74.027	242.870	Do.	P. B. M. 29	168.377	552.417
Randolph, Tenn.	P. B. M. 46	104.298	342.184	Near Muscatine, Iowa	P. B. M. 30	168.736	553.595
Near Randolph, Tenn.	P. B. M. 47	119.696	392.703	Do.	P. B. M. 31	168.498	552.814
				Do.	P. B. M. 32	171.131	561.452
				Fairport, Iowa	P. B. M. 33	169.332	555.550

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Montpelier, Iowa....	P. B. M. 34.....	169.044	554.605	Near Highwood, Minn.....	P. B. M. 78.....	216.373	709.884
Do.....	P. B. M. 35.....	172.155	564.812	Near Red Rock, Minn.....	T. B. M. 11.....	221.249	725.881
Do.....	P. B. M. 35a.....	169.868	557.309	Newport, Minn.....	T. B. M. 12.....	226.647	743.591
Buffalo, Iowa.....	P. B. M. 36.....	172.346	565.438	Do.....	P. B. M. 79.....	225.476	739.749
Near Buffalo, Iowa.....	P. B. M. 37.....	173.412	568.936	Do.....	P. B. M. 80.....	226.695	743.749
West Davenport, Iowa.....	P. B. M. 38.....	172.976	567.505	Newport Landing, Minn.....	Old U. S. B. M. 12.....	211.169	692.811
Near West Davenport, Iowa.....	P. B. M. 39.....	174.822	573.562	St. Paul Park, Minn.....	P. B. M. 81.....	227.167	745.297
On Arsenal Island, Ill.....	P. B. M. 40.....	176.061	577.627	Near St. Paul Park, Minn.....	T. B. M. 14.....	229.328	752.387
Rock Island, Ill.....	P. B. M. 41.....	177.252	581.534	Do.....	P. B. M. 83.....	228.704	750.340
Near Moline, Ill.....	P. B. M. 42.....	173.518	569.284	Do.....	P. B. M. 84.....	229.921	754.332
Watertown, Ill.....	P. B. M. 43.....	175.377	575.383	Near Pullman, Minn.....	T. B. M. 17.....	227.220	745.471
Hampton, Ill.....	P. B. M. 44.....	176.948	580.537	Near head of Nininger Slough, Minn.....	P. B. M. 85.....	211.440	693.700
Do.....	P. B. M. 45.....	173.892	570.511	Do.....	P. B. M. 86.....	212.664	697.715
Rapids City, Ill.....	P. B. M. 46.....	175.791	576.741	Near Island 18, Minn.....	T. B. M. 22.....	211.215	691.252
Near Port Byron, Ill.....	P. B. M. 47.....	176.901	580.353	Foot of Nininger Slough, Minn.....	P. B. M. 87.....	210.694	691.252
Port Byron, Ill.....	P. B. M. 48.....	177.351	581.859	Near mouth of Nininger Slough, Minn.....	Old U. S. B. M. 23.....	211.582	694.166
Do.....	P. B. M. 49.....	179.153	587.771	Near Hastings, Minn.....	T. B. M. 23.....	211.448	693.726
Cordova, Ill.....	P. B. M. 50.....	175.005	574.162	Do.....	P. B. M. 88.....	210.750	691.435
Do.....	P. B. M. 51.....	181.465	595.356	Do.....	P. B. M. 89.....	211.972	695.445
Albany, Ill.....	P. B. M. 52.....	181.651	595.967	Do.....	P. B. M. 96.....	210.580	690.878
Near Albany, Ill.....	P. B. M. 53.....	182.554	598.929	Hastings, Minn.....	P. B. M. 97.....	211.699	694.549
Do.....	P. B. M. 54.....	176.252	578.253	Point Douglas, Minn.....	T. B. M. 26.....	215.956	708.515
Near Fulton, Ill.....	P. B. M. 55.....	177.246	581.515	Do.....	P. B. M. 90.....	217.031	712.043
Fulton, Ill.....	P. B. M. 56.....	177.631	582.778	Prescott, Wis.....	T. B. M. 27.....	212.714	697.891
Near Fulton, Ill.....	P. B. M. 57.....	182.144	597.584	Do.....	T. B. M. 28.....	213.672	701.022
Fulton, Ill.....	P. B. M. 58.....	177.707	583.027	Do.....	P. B. M. 91.....	211.791	694.851
Near Fulton, Ill.....	P. B. M. 59.....	179.784	589.841	Near Prescott, Wis.....	T. B. M. 30.....	208.910	685.399
Thomson, Ill.....	P. B. M. 60.....	184.817	606.354	Do.....	P. B. M. 92.....	209.408	687.032
Near Savanna, Ill.....	P. B. M. 61.....	178.963	587.148	Do.....	P. B. M. 93.....	210.625	691.026
Savanna, Ill.....	P. B. M. 62.....	180.537	592.312	Do.....	P. B. M. 94.....	207.146	679.612
Do.....	McKenzie B. M. 34.....	180.538	592.315	Do.....	P. B. M. 95.....	208.364	683.608
Do.....	P. B. M. 63.....	182.813	599.779	Near Smiths Bar, Wis.....	T. B. M. 35.....	208.322	683.469
Do.....	P. B. M. 64.....	181.044	593.975	Smiths Landing, Wis.....	P. B. M. 98.....	207.431	680.547
Near Hickory Grove, Ill.....	P. B. M. 65.....	205.461	674.083	Do.....	P. B. M. 99.....	208.649	684.543
Mount Carroll, Ill.....	P. B. M. 66.....	249.070	817.157	Do.....	T. B. M. 37.....	207.060	679.329
Near Lanark, Ill.....	P. B. M. 67.....	240.469	788.939	Near Smiths Landing, Wis.....	T. B. M. 38.....	208.250	683.233
Lanark, Ill.....	P. B. M. 68.....	269.241	883.335	Near Morgans Coulee, Wis.....	T. B. M. 39.....	209.576	687.584
Near Lanark, Ill.....	P. B. M. 69.....	256.141	840.356	Near Diamond Bluff, Wis.....	T. B. M. 40.....	211.918	695.268
Near Lanark Junction, Ill.....	P. B. M. 70.....	288.795	947.488	Do.....	T. B. M. 47.....	207.058	679.322
Forreston Junction, Ill.....	P. B. M. 71.....	267.353	877.141	Do.....	P. B. M. 100.....	208.432	683.831
Adeline, Ill.....	P. B. M. 72.....	228.885	750.934	Diamond Bluff, Wis.....	P. B. M. 101.....	209.649	687.823
Leaf River, Ill.....	P. B. M. 73.....	216.148	709.146	Do.....	T. B. M. 45.....	220.354	722.945
Byron, Ill.....	P. B. M. 74.....	222.347	729.483	Do.....	P. B. M. 102.....	220.144	722.256
Near Byron, Ill.....	P. B. M. 75.....	211.367	693.460	Do.....	P. B. M. 103.....	221.360	726.245
Stillman Valley, Ill.....	P. B. M. 76.....	215.461	706.892	Near Diamond Bluff, Wis.....	T. B. M. 46.....	220.988	725.025
Near Davis Junction, Ill.....	P. B. M. 77.....	246.467	808.617	Do.....	P. B. M. 104.....	219.486	720.097
Monroe, Ill.....	P. B. M. 78.....	256.942	842.984	Do.....	P. B. M. 105.....	220.709	724.110
Fielding, Ill.....	P. B. M. 79.....	239.567	785.979	Do.....	T. B. M. 48.....	220.203	722.540
Kirkland, Ill.....	P. B. M. 80.....	236.166	774.821	Trenton, Wis.....	T. B. M. 50.....	233.093	764.739
Kingston, Ill.....	P. B. M. 81.....	245.359	804.982	Trenton Landing, Wis.....	T. B. M. 51.....	205.897	675.514
Genoa, Ill.....	P. B. M. 82.....	255.635	838.696	Do.....	P. B. M. 106.....	205.573	674.451
Hampshire, Ill.....	P. B. M. 83.....	274.427	900.349	Do.....	P. B. M. 107.....	206.797	678.467
Pingree Grove, Ill.....	P. B. M. 84.....	279.756	917.833	Near Island 24, Wis.....	T. B. M. 52.....	206.342	676.974
Near Dumser, Ill.....	P. B. M. 85.....	259.302	850.727	Near Puckerville, Wis.....	T. B. M. 53.....	206.239	676.636
West Elgin, Ill.....	P. B. M. 86.....	218.692	717.492	Do.....	P. B. M. 108.....	205.418	673.942
Do.....	P. B. M. 87.....	218.071	715.455	Do.....	P. B. M. 109.....	206.634	677.932
East Elgin, Ill.....	B. M. Newcomb.....	227.347	745.888	Puckerville, Wis.....	P. B. M. 110.....	205.255	673.407
Near Elgin, Ill.....	P. B. M. 88.....	220.024	721.862	Do.....	P. B. M. 111.....	206.465	677.378
Bartlett, Ill.....	P. B. M. 89.....	245.077	804.057	Red Wing, Minn.....	P. B. M. 112.....	209.644	687.807
Roselle, Ill.....	P. B. M. 90.....	235.353	772.154	Do.....	P. B. M. 113.....	206.458	677.355
Itasca, Ill.....	P. B. M. 91.....	213.087	699.103	Near Red Wing, Minn.....	T. B. M. 57.....	209.640	687.794
Bensenville, Ill.....	P. B. M. 92.....	207.617	681.157	Do.....	T. B. M. 58.....	215.687	707.633
Manheim, Ill.....	P. B. M. 93.....	198.449	651.078	Do.....	P. B. M. 114.....	212.460	697.046
Cragin, Ill.....	P. B. M. 94.....	188.388	618.070	Do.....	T. B. M. 59.....	204.874	672.157
Chicago, Ill.....	P. B. M. 95.....	180.384	591.810	Do.....	P. B. M. 115.....	213.675	701.032
Do.....	P. B. M. 97.....	181.606	595.819	Do.....	T. B. M. 60.....	204.902	672.250
Do.....	P. B. M. 99.....	180.308	591.560	Do.....	T. B. M. 61.....	204.603	671.268
In Lake Michigan, Ill.....	P. B. M. 100.....	179.212	587.965	Near Wacouta, Minn.....	P. B. M. 116.....	206.122	676.252
Chicago, Ill.....	B. M. I.....	181.543	595.612	Do.....	P. B. M. 117.....	207.338	680.242
Do.....	B. M. II.....	181.055	594.011	Wacouta, Minn.....	P. B. M. 118.....	206.085	676.131
Do.....	B. M. III.....	179.793	589.871	Do.....	P. B. M. 119.....	207.304	680.130
Do.....	B. M. IV.....	180.796	593.752	Near Lake Side, Minn.....	P. B. M. 120.....	205.552	674.382
Do.....	B. M. VIII.....	180.976	593.162	Do.....	P. B. M. 121.....	206.772	678.384
Do.....	B. M. IX.....	180.897	593.403	Do.....	T. B. M. 66.....	204.880	672.177
Do.....	B. M. XIII.....	179.575	589.156	Do.....	T. B. M. 67.....	204.649	671.419
St. Paul, Minn.....	P. B. M. 66.....	218.841	717.981	Do.....	T. B. M. 69.....	204.271	670.179
Do.....	T. B. M. 1.....	218.209	716.209	Do.....	T. B. M. 70.....	203.894	668.942
Do.....	P. B. M. 65.....	217.621	713.978	Lake Side, Minn.....	P. B. M. 122.....	205.685	674.819
Do.....	P. B. M. 67.....	215.841	708.138	Do.....	P. B. M. 123.....	206.901	678.807
Do.....	P. B. M. 68.....	214.198	702.748	Florence, Minn.....	T. B. M. 76.....	208.891	685.337
Do.....	Old U. S. B. M. A.....	215.414	706.737	Do.....	P. B. M. 124.....	207.126	679.546
Do.....	Old U. S. B. M. 2.....	211.756	694.736	Do.....	P. B. M. 125.....	208.345	683.545
Do.....	P. B. M. 70.....	214.649	704.227	Near Florence, Minn.....	T. B. M. 77.....	204.968	672.466
Do.....	P. B. M. 71.....	215.869	708.230	Central Point, Minn.....	P. B. M. 126.....	205.907	675.547
Do.....	P. B. M. 72.....	237.677	779.779	Do.....	P. B. M. 127.....	207.122	679.533
Do.....	P. B. M. 73.....	213.263	699.690	Lake City, Minn.....	P. B. M. 128.....	210.195	689.615
Do.....	P. B. M. 74.....	214.483	703.683	Do.....	P. B. M. 129.....	210.223	689.707
Do.....	P. B. M. 75.....	212.716	697.886	Do.....	Old U. S. B. M.....	205.770	675.097
Daytons Bluff, Minn.....	P. B. M. 76.....	213.933	701.878	Near Lake City, Minn.....	P. B. M. 130.....	210.933	692.036
Do.....	T. B. M. 8.....	212.652	697.676	Do.....	P. B. M. 131.....	212.154	696.042
Near Highwood, Minn.....	P. B. M. 77.....	215.155	705.888	Do.....	T. B. M. 84.....	208.580	684.316
Do.....	T. B. M. 9.....	212.652	697.676	Near Kings Coulee, Minn.....	T. B. M. 86.....	207.227	679.878
Do.....	P. B. M. 10.....	216.754	711.133	Keplers Coulee, Minn.....	P. B. M. 132.....	207.497	681.708
Do.....				Kings Coulee, Minn.....	T. B. M. 87.....	207.408	680.471

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Kings Coulee, Minn.	P. B. M. 133.	208.130	682.807	Dresbach, Minn.	Old U. S. B. M. 1303.	137.000	448.340
Do.	P. B. M. 134.	209.343	686.819	Do.	P. B. M. 184.	210.203	689.641
Dutchmans Coulee, Minn.	T. B. M. 88.	207.003	679.143	Near Dresbach, Minn.	T. B. M. 151.	201.130	659.874
Near Kings Coulee, Minn.	T. B. M. 89.	208.434	683.837	Do.	P. B. M. 185.	201.043	656.307
Near Reeds Landing, Minn.	T. B. M. 90.	207.670	681.331	Do.	P. B. M. 186.	201.253	660.317
Do.	P. B. M. 135.	208.828	685.180	Do.	T. B. M. 153.	202.182	663.826
Do.	P. B. M. 136.	210.047	689.129	Near River Junction, Minn.	T. B. M. 154.	201.264	660.313
Near Roscoes Coulee, Minn.	T. B. M. 91.	208.483	683.998	Near La Crescent, Minn.	P. B. M. 187.	198.968	652.780
Reeds Landing, Minn.	P. B. M. 137.	209.103	686.032	Do.	P. B. M. 188.	199.100	652.800
Do.	T. B. M. 93.	208.307	683.421	Do.	T. B. M. 155.	196.281	643.943
Do.	Old U. S. B. M. A.	210.331	689.061	Near La Crosse, Wis.	Old U. S. B. M. 139.	198.583	651.517
Do.	P. B. M. 138.	208.843	685.179	Do.	P. B. M. 189.	199.000	653.181
Do.	P. B. M. 139.	210.058	689.165	Do.	P. B. M. 190.	199.114	653.260
Wabasha, Minn.	P. B. M. 140.	210.480	689.350	North La Crosse, Wis.	T. B. M. 157.	197.924	649.355
Do.	Old U. S. B. M. 624.	206.470	677.394	Do.	P. B. M. 191.	197.210	647.013
Do.	Old U. S. B. M. E.	210.443	690.428	Do.	T. B. M. 158.	196.873	645.907
Do.	P. B. M. 141.	206.768	678.372	La Crosse, Wis.	City B. M. (Front Street).	198.576	651.495
Do.	P. B. M. 142.	207.978	682.341	Do.	P. B. M. 192.	207.158	679.651
Teepee Point, Minn.	P. B. M. 143.	205.135	673.014	Do.	T. B. M. 160.	200.435	657.594
Do.	P. B. M. 144.	206.119	676.997	Do.	City B. M. (near bridge).	195.390	641.042
Near Alma, Wis.	P. B. M. 145.	202.334	663.824	Do.	P. B. M. 193.	196.296	644.015
Do.	P. B. M. 146.	203.551	667.817	Do.	T. B. M. 161.	201.312	660.471
Alma, Wis.	T. B. M. 104.	205.428	673.975	Do.	T. B. M. 162.	205.517	674.267
Do.	P. B. M. 147.	205.430	673.982	Do.	P. B. M. 194.	198.028	649.697
Do.	Old U. S. B. M. 1.	207.385	680.396	Do.	P. B. M. 195.	199.246	653.001
Do.	Old U. S. B. M. 3.	207.982	682.354	Near Stoddard, Wis.	P. B. M. 196.	196.000	643.364
Do.	P. B. M. 148.	209.504	687.348	Do.	P. B. M. 197.	197.312	647.348
Do.	Old U. S. B. M. 4.	207.254	679.966	Do.	T. B. M. 170.	195.985	642.994
Near Alma, Wis.	T. B. M. 105.	206.719	678.211	Do.	T. B. M. 172.	195.408	641.101
Do.	P. B. M. 149.	205.944	675.668	Stoddard, Wis.	P. B. M. 198.	196.786	645.622
Do.	P. B. M. 150.	207.156	679.645	Warners Landing, Wis.	P. B. M. 199.	194.118	636.868
Do.	T. B. M. 107.	205.396	673.870	Do.	P. B. M. 200.	195.336	640.865
Do.	P. B. M. 151.	203.678	668.234	Britts Landing, Wis.	T. B. M. 175.	196.228	643.791
Do.	P. B. M. 152.	204.895	672.226	Near Genoa, Wis.	P. B. M. 201.	194.592	638.424
Near Cochrane, Wis.	P. B. M. 153.	204.188	669.907	Do.	P. B. M. 202.	195.815	642.437
Do.	P. B. M. 154.	205.410	673.916	Do.	T. B. M. 177.	195.158	640.281
Near Fountain City, Wis.	T. B. M. 117.	203.628	668.070	Do.	T. B. M. 178.	195.735	642.174
Do.	P. B. M. 155.	200.384	657.426	Do.	P. B. M. 203.	195.000	640.000
Do.	P. B. M. 156.	201.602	661.423	Genoa, Wis.	Old U. S. B. M. 1.	195.095	640.075
Do.	T. B. M. 121.	201.313	660.474	Near Genoa, Wis.	T. B. M. 190.	195.647	641.885
Do.	P. B. M. 157.	199.624	654.933	Do.	P. B. M. 204.	193.395	614.400
Do.	P. B. M. 158.	200.844	658.936	Do.	P. B. M. 205.	194.614	638.496
Fountain City, Wis.	T. B. M. 122.	203.024	666.088	Tippets Landing, Wis.	T. B. M. 186.	195.406	641.094
Do.	Old U. S. B. M. 1	200.872	659.028	Do.	P. B. M. 206.	195.912	642.755
Do.	H. W. G.			Do.	P. B. M. 207.	197.134	646.764
Do.	Old U. S. B. M. A.	204.896	672.230	Victory, Wis.	P. B. M. 208.	195.211	640.455
Do.	P. B. M. 159.	205.844	675.340	Near Victory, Wis.	T. B. M. 183.	194.612	639.400
Near Fountain City, Wis.	T. B. M. 123.	202.474	664.283	Near De Soto, Wis.	P. B. M. 209.	193.045	633.348
Do.	P. B. M. 160.	203.946	669.113	Do.	P. B. M. 210.	194.266	637.354
Do.	P. B. M. 161.	205.165	673.113	Do.	T. B. M. 192.	194.487	638.079
Near Island 65, Wis.	T. B. M. 124.	203.437	667.443	De Soto, Wis.	T. B. M. 193.	195.743	642.200
Island 69, Wis.	P. B. M. 125.	201.918	662.460	Do.	P. B. M. 211.	190.983	626.584
Do.	P. B. M. 126.	201.234	660.215	Do.	P. B. M. 212.	194.024	636.561
Do.	P. B. M. 163.	201.952	662.571	Near De Soto, Wis.	T. B. M. 195.	194.036	636.590
Near Island 69, Wis.	T. B. M. 126.	202.744	665.170	Do.	P. B. M. 213.	192.551	631.728
Opposite Winona, Minn., in Wis.	T. B. M. 127.	203.779	668.565	Do.	P. B. M. 214.	193.760	635.694
Do.	P. B. M. 164.	197.352	647.479	Do.	T. B. M. 196.	193.770	635.727
Do.	P. B. M. 165.	198.565	651.453	Near Rush Creek, Wis.	T. B. M. 197.	193.965	636.465
Winona, Minn.	Old U. S. B. M. XVII	200.809	658.821	Near Ferryville, Wis.	T. B. M. 198.	193.114	633.575
Do.	P. B. M. 166.	200.565	658.020	Do.	P. B. M. 215.	192.724	632.296
Do.	P. B. M. 167.	201.717	661.800	Do.	P. B. M. 216.	193.945	636.301
Do.	New Gauge at Winona.	195.110	640.123	Do.	T. B. M. 200.	192.911	632.909
Do.	Old U. S. B. M. b.	200.932	659.224	Ferryville, Wis.	P. B. M. 217.	191.692	628.900
Do.	Winona City B. M.	200.607	658.158	Do.	P. B. M. 218.	192.914	632.919
Do.	Old U. S. B. M.	200.837	658.912	Near Ferryville, Wis.	T. B. M. 202.	193.674	635.412
Do.	P. B. M. 168.	203.102	666.344	Do.	T. B. M. 204.	191.981	629.838
Do.	Old U. S. B. M. B.	200.472	657.715	Do.	P. B. M. 219.	190.360	624.539
Do.	Old U. S. B. M. on Liberty and Second Streets.	201.502	661.095	Do.	P. B. M. 220.	191.579	628.538
Do.	Old U. S. B. M. on Keys' barn.	203.525	667.732	Near Lynxville, Wis.	P. B. M. 221.	191.933	629.716
Do.	P. B. M. 169.	202.353	663.886	Do.	P. B. M. 222.	193.158	633.719
Minneapolis, Minn.	P. B. M. 170.	198.212	650.301	Do.	T. B. M. 206.	192.862	632.748
Do.	P. B. M. 171.	199.428	654.290	Lynxville, Wis.	T. B. M. 207.	193.586	635.124
Near Winona, Minn.	T. B. M. 130.	199.945	655.996	Do.	Old U. S. B. M.	194.437	637.915
Near Homer, Minn.	T. B. M. 131.	201.309	660.461	Do.	P. B. M. 223.	194.620	638.515
Do.	P. B. M. 172.	200.565	658.020	Near Lynxville, Wis.	T. B. M. 209.	192.845	632.692
Do.	P. B. M. 173.	201.782	662.013	Do.	P. B. M. 211.	192.796	632.531
Do.	T. B. M. 132.	200.600	658.136	Do.	P. B. M. 224.	192.028	630.012
Do.	T. B. M. 133.	201.317	660.487	Do.	P. B. M. 225.	193.246	634.008
Do.	P. B. M. 174.	203.888	668.923	Near Viola, Wis.	T. B. M. 212.	193.507	634.864
Do.	P. B. M. 175.	205.108	672.925	Do.	T. B. M. 213.	193.663	635.376
Near Lamolille, Minn.	T. B. M. 135.	200.067	656.387	Near Charme, Wis.	T. B. M. 215.	191.769	629.162
Lamolille, Minn.	P. B. M. 176.	199.406	654.218	Do.	P. B. M. 226.	192.259	630.799
Do.	P. B. M. 177.	200.621	658.204	Do.	P. B. M. 227.	193.478	634.769
Near Richmond, Minn.	T. B. M. 142.	204.230	670.045	Do.	P. B. M. 228.	193.633	635.442
Richmond, Minn.	P. B. M. 178.	199.815	655.560	Charme, Wis.	T. B. M. 216.	193.172	633.765
Do.	P. B. M. 179.	201.034	659.559	Near Charme, Wis.	T. B. M. 218.	192.615	631.938
Do.	T. B. M. 144.	199.888	655.799	Do.	P. B. M. 229.	192.165	630.461
Near Dakota, Minn.	T. B. M. 146.	204.591	671.229	Do.	P. B. M. 230.	193.383	634.457
Near Richmond, Minn.	P. B. M. 190.	202.069	662.955	Prairie du Chien, Wis.	T. B. M. 225.	194.833	639.215
Do.	P. B. M. 181.	203.201	666.804	Do.	P. B. M. 231.	196.128	643.464
Dakota, Minn.	P. B. M. 182.	202.023	662.803	Do.	P. B. M. 232.	192.350	631.068
Do.	P. B. M. 183.	203.242	666.803	Do.	Old U. S. B. M. a.	192.350	631.068
Do.	Old U. S. B. M. 131.	198.963	652.704	Do.	T. B. M. 226.	190.810	626.016
				North McGregor, Iowa.	T. B. M. 227.	190.198	627.727
				Do.	P. B. M. 233.	192.418	631.592
				South McGregor, Iowa.	T. B. M. 228.	191.670	628.858

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
South McGregor, Iowa.	P. B. M. 234.	192.529	631.655	Dubuque, Iowa.	City B. M. Jess Store	185.616	608.976
Do.	P. B. M. 235.	192.879	632.804	Do.	T. B. M. 297.	185.413	608.309
Near South McGregor, Iowa.	T. B. M. 230.	192.685	632.167	Do.	Old U. S. B. M. a.	185.151	607.450
Do.	P. B. M. 236.	191.345	627.771	Do.	Old U. S. B. M. b.	184.804	606.311
Do.	P. B. M. 237.	192.565	631.774	Do.	P. B. M. 281.	186.679	612.463
Do.	P. B. M. 238.	193.814	635.872	Near Dubuque, Iowa.	T. B. M. 299.	186.166	610.779
Do.	T. B. M. 231.	191.281	627.561	Do.	P. B. M. 282.	185.940	610.038
Near Island 176, Iowa.	T. B. M. 232.	190.446	624.822	Do.	P. B. M. 283.	187.159	614.037
Near Sny McGill, Iowa.	P. B. M. 239.	190.360	624.539	Near Cattese, Iowa.	T. B. M. 301.	188.003	616.807
Do.	P. B. M. 240.	191.477	628.204	Do.	P. B. M. 284.	186.852	613.031
Clayton, Iowa.	Old U. S. B. M. b.	189.751	622.541	Do.	P. B. M. 285.	188.071	617.030
Do.	Old U. S. B. M.	190.847	626.137	Cattese, Iowa.	T. B. M. 302.	188.131	617.226
Do.	P. B. M. 241.	198.213	650.304	Near Cattese, Iowa.	T. B. M. 303.	187.469	615.054
Near Clayton, Iowa.	T. B. M. 239.	192.650	632.053	Do.	T. B. M. 304.	185.110	607.315
Do.	P. B. M. 242.	192.230	630.674	Do.	Old U. S. B. M. 24.	180.150	591.042
Do.	T. B. M. 241.	191.508	628.306	Shawondasee Club Grounds, Iowa.	P. B. M. 286.	183.725	602.771
Near Eckard, Iowa.	P. B. M. 243.	188.979	620.008	Do.	T. B. M. 287.	184.944	606.771
Do.	P. B. M. 244.	190.200	624.015	Near Massey, Iowa.	T. B. M. 307.	185.834	609.690
Do.	T. B. M. 245.	189.895	623.014	Do.	T. B. M. 308.	185.039	607.082
Near Guttenberg, Iowa.	P. B. M. 245.	188.225	617.535	Near Nine Mile Island, Iowa.	P. B. M. 288.	184.030	603.772
Do.	P. B. M. 246.	189.442	621.528	Do.	P. B. M. 289.	185.249	607.771
Guttenberg, Iowa.	P. B. M. 247.	192.510	631.593	Do.	T. B. M. 311.	186.401	611.551
Do.	P. B. M. 248.	194.524	638.200	Do.	T. B. M. 312.	186.382	611.489
Do.	T. B. M. 250.	187.849	616.301	Near Snyder's, Iowa.	P. B. M. 290.	184.226	604.415
Near Guttenberg, Iowa.	T. B. M. 252.	189.887	622.988	Near Gordons Ferry, Iowa.	P. B. M. 291.	185.446	608.417
Do.	P. B. M. 249.	188.014	616.842	Do.	P. B. M. 314.	182.632	599.185
Do.	P. B. M. 250.	189.232	620.839	Do.	P. B. M. 292.	183.096	600.707
Do.	T. B. M. 253.	189.653	622.220	Do.	P. B. M. 293.	184.316	604.710
Do.	T. B. M. 254.	192.236	630.694	Do.	P. B. M. 315.	186.563	612.082
Near Turkey River Junction, Iowa.	T. B. M. 256.	190.403	624.681	Gordons Ferry, Iowa.	P. B. M. 294.	187.245	614.320
Turkey River Junction, Iowa.	P. B. M. 251.	190.928	626.403	Do.	P. B. M. 295.	188.459	618.303
Do.	T. B. M. 257.	187.905	616.485	Near Gordons Ferry, Iowa.	T. B. M. 318.	185.288	611.180
Do.	P. B. M. 252.	187.909	616.498	Do.	P. B. M. 296.	185.076	607.203
Near Turkey River Junction, Iowa.	T. B. M. 258.	189.927	623.119	Do.	P. B. M. 297.	186.299	611.216
Near Buena Vista, Iowa.	P. B. M. 253.	188.097	617.115	Near Smiths Station, Iowa.	T. B. M. 321.	185.199	607.607
Do.	P. B. M. 254.	189.316	621.114	Do.	P. B. M. 298.	183.535	602.147
Do.	T. B. M. 262.	190.709	625.684	Do.	P. B. M. 299.	184.749	606.130
Buena Vista, Iowa.	T. B. M. 264.	191.170	627.197	Do.	T. B. M. 323.	185.562	608.798
Do.	P. B. M. 255.	191.268	627.519	Do.	P. B. M. 300.	184.771	606.203
Near Buena Vista, Iowa.	T. B. M. 265.	191.464	628.161	Do.	P. B. M. 301.	185.982	610.176
Do.	T. B. M. 267.	191.322	627.696	Near North Bellevue, Iowa.	P. B. M. 302.	190.964	626.521
Near Waupeton, Iowa.	P. B. M. 256.	190.129	623.781	Do.	P. B. M. 303.	180.369	591.761
Do.	P. B. M. 257.	191.348	627.781	Do.	P. B. M. 304.	181.580	595.734
Do.	T. B. M. 269.	191.853	629.438	Bellevue, Iowa.	P. B. M. 305.	188.641	618.900
Do.	T. B. M. 270.	190.897	626.302	Do.	P. B. M. 306.	189.860	622.899
Do.	P. B. M. 258.	187.709	615.842	Do.	P. B. M. 307.	188.762	619.297
Do.	P. B. M. 259.	188.925	619.831	Do.	Old U. S. B. M.	181.976	597.033
Do.	T. B. M. 273.	190.942	626.449	Do.	T. B. M. 326.	185.427	608.355
Finley Landing, Iowa.	P. B. M. 260.	188.632	618.870	Do.	P. B. M. 308.	186.190	610.858
Do.	P. B. M. 261.	189.852	622.873	Near Bellevue, Iowa.	P. B. M. 309.	184.455	605.166
Near Island 207, Iowa.	P. B. M. 262.	187.642	615.622	Do.	T. B. M. 310.	185.668	609.146
Frenchtown Landing, Iowa.	T. B. M. 277.	187.148	614.002	Do.	T. B. M. 329.	184.624	605.721
Do.	P. B. M. 263.	186.196	610.878	Do.	T. B. M. 331.	183.006	600.412
Do.	P. B. M. 264.	187.415	614.877	Do.	P. B. M. 311.	181.550	595.636
Spechts Ferry, Iowa.	Old P. B. M. No. 30.	187.590	615.452	Do.	P. B. M. 312.	182.767	599.628
Do.	Old U. S. B. M. a.	187.735	615.927	Do.	P. B. M. 313.	179.528	589.002
Do.	P. B. M. 265.	186.358	611.409	Do.	P. B. M. 314.	180.738	592.972
Do.	P. B. M. 266.	187.577	615.409	Do.	P. B. M. 315.	179.138	587.722
Do.	T. B. M. 279.	188.336	617.899	Do.	P. B. M. 316.	180.346	591.685
Near Spechts Ferry, Iowa.	T. B. M. 280.	188.539	618.565	Harris Landing, Ill.	P. B. M. 317.	186.262	611.061
Do.	P. B. M. 267.	185.798	609.572	Do.	P. B. M. 318.	187.461	615.028
Do.	P. B. M. 268.	187.021	613.585	Do.	P. B. M. 319.	186.596	612.191
2 1/2 miles above Little Maquoketa River, Iowa.	P. B. M. 269.	188.395	618.092	Do.	P. B. M. 320.	187.815	616.189
Do.	P. B. M. 270.	189.622	622.119	Near Harris Landing, Ill.	P. B. M. 321.	188.974	619.992
1 1/2 miles above Little Maquoketa River, Iowa.	T. B. M. 283.	187.937	616.590	Do.	P. B. M. 322.	190.193	623.992
1/2 mile above Edmore, Iowa.	P. B. M. 271.	186.632	612.309	Opposite foot of Island 256.	P. B. M. 323.	190.249	624.175
Do.	P. B. M. 272.	187.851	616.308	Do.	P. B. M. 324.	191.467	628.171
2.3 miles above Eagle Point, Iowa.	T. B. M. 287.	186.357	611.406	Near Arnold Landing, Ill.	P. B. M. 325.	178.718	586.344
Do.	P. B. M. 273.	185.405	608.283	Do.	P. B. M. 326.	179.935	590.337
Do.	P. B. M. 274.	186.623	612.279	Arnold Landing, Ill.	P. B. M. 327.	186.394	611.527
Near Eagle Point, Iowa.	T. B. M. 289.	188.473	618.348	Near Arnold Landing, Ill.	P. B. M. 328.	181.075	594.077
Eagle Point, Iowa.	T. B. M. 291.	185.582	608.864	Do.	P. B. M. 329.	182.284	598.044
Dubuque, Iowa.	P. B. M. 275.	184.671	605.875	Near Marcus, Ill.	P. B. M. 330.	178.084	584.264
Do.	P. B. M. 276.	185.324	608.017	Do.	P. B. M. 331.	179.305	588.270
Do.	P. B. M. 277.	186.541	612.010	Near Savanna, Ill.	P. B. M. 332.	179.782	593.834
Eagle Point, Iowa.	Old U. S. B. M. 23.	181.212	594.527	Do.	P. B. M. 333.	181.005	593.847
Dubuque, Iowa.	T. B. M. 293.	186.259	611.085	Do.	P. B. M. 334.	180.460	592.059
Do.	T. B. M. 294.	185.776	609.500	Do.	P. B. M. 335.	181.677	596.052
Do.	P. B. M. 278.	185.814	609.624	Savanna, Ill.	Old U. S. B. M. 18.	176.856	580.235
Do.	T. B. M. 295.	185.181	607.548	Do.	P. B. M. 336.	182.568	598.975
Do.	P. B. M. 279.	196.547	644.838	Do.	P. B. M. 337.	178.616	586.009
Do.	P. B. M. 280.	188.399	618.106	Do.	P. B. M. 338.	179.832	589.999
East Dubuque, Ill.	Old U. S. B. M. a.	187.525	615.239	St. Paul, Minn.	T. B. M. 23.	248.469	815.185
Do.	Old U. S. B. M. b.	187.302	614.506	Do.	T. B. M. 22.	252.328	827.846
Dubuque, Iowa.	T. B. M. 296.	185.438	608.391	Do.	P. B. M. Macalester.	284.250	932.577
Do.	City B. M. Julien House.	186.729	612.626	Do.	(Top of cap over same)	285.459	936.544
				Do.	T. B. M. 18.	276.930	908.561
				Do.	T. B. M. 16.	264.893	869.070
				Minneapolis, Minn.	T. B. M. 13.	256.072	840.130
				Do.	P. B. M. University Campus.	256.774	842.432

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Minneapolis, Minn.	P. B. M. Pillsbury Hall.	258.428	847.859	Near Royalton, Minn.	(P. B. M. 212) (Top of cap over same)	332.514	1089.840
Do.	T. B. M. 12.	252.406	828.102	Do.	(P. B. M. 212) (Top of cap over same)	332.731	1091.685
Do.	(P. B. M. 212) (Top of cap over same)	242.012	794.001	Do.	(P. B. M. 212) (Top of cap over same)	333.931	1095.572
Do.	P. B. M. Great Northern.	243.225	797.981	Near Little Falls, Minn.	(P. B. M. 212) (Top of cap over same)	336.046	1102.511
Do.	P. B. M. 3.	258.367	847.659	Do.	(P. B. M. 212) (Top of cap over same)	337.248	1106.455
Do.	P. B. M. Brewery.	248.748	816.100	Do.	(P. B. M. 212) (Top of cap over same)	338.002	1111.881
Do.	T. B. M. 11.	252.214	827.472	Little Falls, Minn.	T. B. M. 152.	340.112	1115.851
Do.	P. B. M. Gluck.	253.326	831.120	Do.	(P. B. M. 212) (Top of cap over same)	339.337	1113.308
Do.	(P. B. M. 212) (Top of cap over same)	252.973	829.962	Near Little Falls, Minn.	(P. B. M. 212) (Top of cap over same)	340.746	1117.931
Do.	(P. B. M. 212) (Top of cap over same)	254.186	833.942	Belle Prairie, Minn.	(P. B. M. 212) (Top of cap over same)	341.942	1121.855
Do.	T. B. M. 21.	253.889	832.968	Do.	(P. B. M. 212) (Top of cap over same)	343.721	1127.092
Near Minneapolis, Minn.	(P. B. M. 212) (Top of cap over same)	254.621	835.369	Near Belle Prairie, Minn.	(P. B. M. 212) (Top of cap over same)	344.933	1131.668
Near Fridley, Minn.	(P. B. M. 212) (Top of cap over same)	258.171	847.016	Do.	(P. B. M. 212) (Top of cap over same)	347.009	1135.297
Near Anoka, Minn.	T. B. M. 27.	259.383	850.993	Near Fort Ripley, Minn.	(P. B. M. 212) (Top of cap over same)	347.249	1139.266
Do.	(P. B. M. 212) (Top of cap over same)	270.483	887.410	Do.	(P. B. M. 212) (Top of cap over same)	348.088	1142.019
Do.	(P. B. M. 212) (Top of cap over same)	267.290	876.934	Do.	(P. B. M. 212) (Top of cap over same)	349.302	1146.001
Do.	T. B. M. 29.	268.504	880.917	Do.	(P. B. M. 212) (Top of cap over same)	350.618	1150.519
Do.	(P. B. M. 212) (Top of cap over same)	260.670	855.214	Do.	(P. B. M. 212) (Top of cap over same)	351.835	1154.312
Do.	(P. B. M. 212) (Top of cap over same)	254.519	835.034	Near Old Fort Ripley, Minn.	(P. B. M. 212) (Top of cap over same)	353.049	1160.116
Do.	(P. B. M. 212) (Top of cap over same)	255.724	838.988	Do.	(P. B. M. 212) (Top of cap over same)	354.267	1163.472
Do.	(P. B. M. 212) (Top of cap over same)	264.310	867.157	Near Island No. 22, Minn.	(P. B. M. 212) (Top of cap over same)	353.417	1159.502
Do.	(P. B. M. 212) (Top of cap over same)	265.525	871.144	Do.	(P. B. M. 212) (Top of cap over same)	360.617	1183.124
Do.	(P. B. M. 212) (Top of cap over same)	260.936	856.088	Near Old Crow Wing Ferry, Minn.	(P. B. M. 212) (Top of cap over same)	361.828	1187.097
Anoka, Minn.	(P. B. M. 212) (Top of cap over same)	262.144	860.051	Do.	(P. B. M. 212) (Top of cap over same)	361.634	1186.461
Do.	P. B. M. Anoka.	258.824	849.158	Do.	(P. B. M. 212) (Top of cap over same)	362.845	1190.434
Do.	(P. B. M. 212) (Top of cap over same)	256.642	841.999	Do.	(P. B. M. 212) (Top of cap over same)	358.624	1176.585
Near Anoka, Minn.	(P. B. M. 212) (Top of cap over same)	257.855	845.980	Near Brainerd, Minn.	(P. B. M. 212) (Top of cap over same)	359.834	1180.555
Do.	(P. B. M. 212) (Top of cap over same)	261.220	857.020	Do.	(P. B. M. 212) (Top of cap over same)	363.145	1191.419
Near Itasca, Minn.	(P. B. M. 212) (Top of cap over same)	262.428	860.983	Do.	T. B. M. 195.	364.353	1195.382
Do.	(P. B. M. 212) (Top of cap over same)	268.187	879.877	Do.	T. B. M. 196.	377.192	1237.504
Near Elk River, Minn.	(P. B. M. 212) (Top of cap over same)	269.397	883.847	Do.	(P. B. M. 212) (Top of cap over same)	372.266	1221.343
Do.	(P. B. M. 212) (Top of cap over same)	269.943	885.638	Brainerd, Minn.	(P. B. M. 212) (Top of cap over same)	370.425	1215.303
Near Elk River, Minn.	(P. B. M. 212) (Top of cap over same)	271.149	889.595	Do.	(P. B. M. 212) (Top of cap over same)	371.635	1219.272
Do.	(P. B. M. 212) (Top of cap over same)	271.654	891.252	Do.	(P. B. M. 212) (Top of cap over same)	368.183	1207.947
Do.	(P. B. M. 212) (Top of cap over same)	272.859	895.205	Do.	(P. B. M. 212) (Top of cap over same)	369.426	1212.025
Do.	P. B. M. Elk River.	266.164	873.240	Do.	(P. B. M. 212) (Top of cap over same)	369.457	1212.127
Near Otsego, Minn.	(P. B. M. 212) (Top of cap over same)	273.563	897.514	Do.	(P. B. M. 212) (Top of cap over same)	370.687	1219.128
Do.	(P. B. M. 212) (Top of cap over same)	274.768	901.468	Do.	(P. B. M. 212) (Top of cap over same)	371.894	1223.269
Near Monticello, Minn.	(P. B. M. 212) (Top of cap over same)	271.628	891.166	Do.	(P. B. M. 212) (Top of cap over same)	372.971	1227.251
Do.	(P. B. M. 212) (Top of cap over same)	272.832	895.116	Do.	(P. B. M. 212) (Top of cap over same)	373.750	1227.570
Do.	(P. B. M. 212) (Top of cap over same)	282.199	925.848	Near Brainerd, Minn.	(P. B. M. 212) (Top of cap over same)	374.468	1229.882
Do.	(P. B. M. 212) (Top of cap over same)	283.390	929.755	Do.	(P. B. M. 212) (Top of cap over same)	370.355	1215.073
Do.	(P. B. M. 212) (Top of cap over same)	283.799	931.097	Near mouth of Rabbit River, Minn.	(P. B. M. 212) (Top of cap over same)	371.568	1219.052
Do.	(P. B. M. 212) (Top of cap over same)	285.013	935.080	Do.	(P. B. M. 212) (Top of cap over same)	368.274	1208.246
Do.	(P. B. M. 212) (Top of cap over same)	283.683	930.717	Do.	(P. B. M. 212) (Top of cap over same)	369.450	1212.202
Do.	(P. B. M. 212) (Top of cap over same)	284.890	934.677	Do.	(P. B. M. 212) (Top of cap over same)	377.687	1239.128
Monticello, Minn.	(P. B. M. 212) (Top of cap over same)	284.439	933.197	Near Old Indian Mission, Minn.	(P. B. M. 212) (Top of cap over same)	378.894	1244.188
Do.	(P. B. M. 212) (Top of cap over same)	285.644	937.151	Do.	(P. B. M. 212) (Top of cap over same)	359.161	1178.348
Do.	T. B. M. 70.	278.220	912.793	Near mouth of Pine River, Minn.	(P. B. M. 212) (Top of cap over same)	360.370	1182.314
Near Monticello, Minn.	(P. B. M. 212) (Top of cap over same)	289.386	949.428	Do.	(P. B. M. 212) (Top of cap over same)	354.205	1165.096
Do.	(P. B. M. 212) (Top of cap over same)	290.594	953.391	Near Island Lake, Minn.	(P. B. M. 212) (Top of cap over same)	365.476	1199.066
Do.	(P. B. M. 212) (Top of cap over same)	288.916	947.885	Do.	(P. B. M. 212) (Top of cap over same)	362.169	1188.216
Do.	(P. B. M. 212) (Top of cap over same)	290.128	951.862	Near Towhead Rapids, Minn.	(P. B. M. 212) (Top of cap over same)	363.372	1192.163
Near Bear Island, Minn.	(P. B. M. 212) (Top of cap over same)	294.193	965.199	Do.	(P. B. M. 212) (Top of cap over same)	365.165	1198.078
Do.	(P. B. M. 212) (Top of cap over same)	295.398	969.152	Near Island No. 1, Minn.	(P. B. M. 212) (Top of cap over same)	367.453	1205.552
Do.	(P. B. M. 212) (Top of cap over same)	295.644	969.959	Do.	(P. B. M. 212) (Top of cap over same)	368.664	1209.525
Do.	(P. B. M. 212) (Top of cap over same)	296.852	973.922	Near Dean Brook, Minn.	(P. B. M. 212) (Top of cap over same)	369.086	1210.910
Near Clearwater, Minn.	(P. B. M. 212) (Top of cap over same)	298.627	979.746	Do.	(P. B. M. 212) (Top of cap over same)	370.296	1214.879
Do.	(P. B. M. 212) (Top of cap over same)	299.838	983.719	Near mouth of Hay Creek, Minn.	(P. B. M. 212) (Top of cap over same)	367.250	1204.886
Do.	(P. B. M. 212) (Top of cap over same)	290.951	954.561	Do.	(P. B. M. 212) (Top of cap over same)	368.460	1208.856
Do.	(P. B. M. 212) (Top of cap over same)	292.159	958.525	Near mouth of Cedar Brook, Minn.	(P. B. M. 212) (Top of cap over same)	364.845	1198.955
Do.	(P. B. M. 212) (Top of cap over same)	304.777	999.923	Do.	(P. B. M. 212) (Top of cap over same)	366.056	1200.990
Near St. Augusta, Minn.	(P. B. M. 212) (Top of cap over same)	305.983	1003.879	Near Aitkin, Minn.	(P. B. M. 212) (Top of cap over same)	364.983	1197.449
Do.	(P. B. M. 212) (Top of cap over same)	307.621	1009.253	Do.	(P. B. M. 212) (Top of cap over same)	366.190	1201.409
Do.	(P. B. M. 212) (Top of cap over same)	308.826	1013.207	Aitkin, Minn.	P. B. M. Courthouse.	370.397	1215.211
Do.	(P. B. M. 212) (Top of cap over same)	308.304	1011.494				
East St. Cloud, Minn.	(P. B. M. 212) (Top of cap over same)	309.513	1015.462				
St. Cloud, Minn.	P. B. M. St. Cloud.	314.612	1032.189	Brainerd, Minn.	T. B. M. 201.	367.459	1205.572
Near St. Cloud, Minn.	T. B. M. 110.	306.006	1003.955	Near Leaks, Minn.	T. B. M. 3.	371.586	1219.111
Near Sauk Rapids, Minn.	(P. B. M. 212) (Top of cap over same)	305.166	1001.198	Do.	T. B. M. 5.	372.298	1221.448
Do.	(P. B. M. 212) (Top of cap over same)	306.374	1005.162	Near Merrifield, Minn.	T. B. M. 6.	372.267	1221.346
Do.	(P. B. M. 212) (Top of cap over same)	306.726	1006.317	Do.	(P. B. M. 212) (Top of cap over same)	370.521	1215.617
Do.	(P. B. M. 212) (Top of cap over same)	312.534	1025.372	Merrifield, Minn.	(P. B. M. 212) (Top of cap over same)	371.734	1219.597
Do.	(P. B. M. 212) (Top of cap over same)	313.745	1029.345	Near Merrifield, Minn.	T. B. M. 10.	371.437	1218.623
Near Little Rock, Minn.	(P. B. M. 212) (Top of cap over same)	311.922	1023.364	Near Hubert, Minn.	T. B. M. 13.	371.810	1219.847
Do.	(P. B. M. 212) (Top of cap over same)	313.130	1027.328	Do.	T. B. M. 14.	372.001	1220.473
Near Rice, Minn.	(P. B. M. 212) (Top of cap over same)	314.077	1030.435	Do.	T. B. M. 16.	367.134	1204.506
Do.	(P. B. M. 212) (Top of cap over same)	315.288	1034.407	Near Hubert, Minn.	T. B. M. 18.	373.528	1225.483
Do.	(P. B. M. 212) (Top of cap over same)	321.693	1055.421	Near Pequot, Minn.	T. B. M. 20.	366.832	1203.514
Do.	(P. B. M. 212) (Top of cap over same)	320.597	1051.826	Do.	T. B. M. 21.	372.194	1221.106
Do.	(P. B. M. 212) (Top of cap over same)	321.810	1055.805	Do.	T. B. M. 22.	378.443	1241.609
Do.	(P. B. M. 212) (Top of cap over same)	321.206	1053.823	Do.	T. B. M. 23.	388.874	1275.830
Do.	(P. B. M. 212) (Top of cap over same)	322.418	1057.799	Pequot, Minn.	T. B. M. 24.	390.804	1282.162
Do.	(P. B. M. 212) (Top of cap over same)	320.784	1052.439	Do.	(P. B. M. 212) (Top of cap over same)	389.391	1277.527
Do.	(P. B. M. 212) (Top of cap over same)	321.994	1056.408	Near Pequot, Minn.	T. B. M. 26.	387.985	1272.914
Near North Prairie, Minn.	(P. B. M. 212) (Top of cap over same)	318.349	1044.450	Jenkins, Minn.	T. B. M. 28.	388.200	1267.275
Do.	(P. B. M. 212) (Top of cap over same)	319.557	1048.413	Near Pine River, Minn.	T. B. M. 30.	388.638	1275.057
Do.	(P. B. M. 212) (Top of cap over same)	324.605	1064.975	Do.	T. B. M. 31.	398.072	1273.200
Do.	(P. B. M. 212) (Top of cap over same)	325.818	1068.955	Do.	T. B. M. 32.	390.213	1280.224

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Pine River, Minn.	T. B. M. 33.....	392.654	1288.232	Near Lake Itasca, Minn.	P. B. M. Park Line..	451.293	1480.617
Pine River, Minn.	T. B. M. 35.....	395.515	1297.619	Do.	Top of cap over same	452.505	1484.593
Do.	P. B. M. Pine River.	394.592	1294.591	Do.	Itasca.....	466.624	1530.915
Do.	Top of cap over same	395.797	1298.544	Do.	Top of cap over same	467.840	1534.905
Near Pine River, Minn.	T. B. M. 37.....	399.440	1310.496	Lake Itasca, Minn.	P. B. M. Park House	453.647	1488.340
Near Mildred, Minn.	T. B. M. 39.....	408.997	1341.851	Do.	Top of cap over same	454.859	1492.317
Do.	T. B. M. 41.....	406.431	1333.432				
Near Backus, Minn.	T. B. M. 43.....	411.086	1348.639				
Backus, Minn.	P. B. M. Backus.....	407.059	1335.492	Cass Lake, Minn.	P. B. M. Roundhouse	403.736	1324.590
Do.	Top of cap over same	408.269	1339.462	Do.	U. S. E. B. M. 347..	404.878	1328.337
Near Island Lake, Minn.	T. B. M. 46.....	409.870	1344.715	Do.	Top of cap over same	406.078	1332.274
Do.	T. B. M. 48.....	404.642	1327.563	Near Cass Lake, Minn.	U. S. E. B. M. 342..	400.687	1314.587
Do.	T. B. M. 49.....	407.124	1335.706	Do.	Top of cap over same	401.884	1318.514
Near Hackensack, Minn.	T. B. M. 50.....	411.737	1350.840	Near Lomond, Minn.	T. B. M. 169.....	403.025	1322.258
Do.	T. B. M. 52.....	422.541	1386.287	Do.	P. B. M. Lomond	398.985	1309.003
Hackensack, Minn.	T. B. M. 53.....	422.864	1387.346	Lomond, Minn.	Spur.....	400.196	1312.977
Do.	P. B. M. Hackensack	422.511	1386.188	Do.	Top of cap over same	397.942	1305.582
Do.	Top of cap over same	423.726	1390.174	Near Lomond, Minn.	U. S. E. B. M. 337..	410.045	1345.290
Near Hackensack, Minn.	T. B. M. 54.....	430.989	1414.003	Cuba, Minn.	Top of cap over same	408.357	1339.751
Do.	T. B. M. 55.....	433.504	1422.254	Near Cuba, Minn.	T. B. M. 172.....	399.592	1310.994
Do.	T. B. M. 56.....	426.416	1399.000	Near Schley, Minn.	T. B. M. 174.....	402.322	1319.951
Lothrop, Minn.	T. B. M. 57.....	425.327	1395.427	Do.	T. B. M. 175.....	405.201	1329.397
Do.	P. B. M. Portage	423.413	1389.147	Do.	T. B. M. 176.....	403.626	1324.229
Near Hunters, Minn.	Lake.....			Do.	T. B. M. 177.....	401.699	1317.907
Do.	Top of cap over same	424.627	1393.130	Near Bena, Minn.	T. B. M. 181.....	401.166	1316.159
Hunters, Minn.	T. B. M. 60.....	422.890	1387.432	Do.	T. B. M. 183.....	400.132	1312.766
Near Hunters, Minn.	T. B. M. 62.....	408.774	1341.119	Do.	Bigosh.....	402.621	1317.652
Near Walker, Minn.	T. B. M. 63.....	400.310	1313.351	Do.	Top of cap over same	402.836	1321.637
Do.	T. B. M. 64.....	397.496	1304.118	Bena, Minn.	Top of cap over same	402.432	1320.312
Do.	T. B. M. 65.....	398.934	1308.836	Do.	R. R. B. M.....	399.003	1309.063
Walker, Minn.	P. B. M. Walker.....	402.531	1320.637	Near Bena, Minn.	Top of cap over same	402.601	1320.867
Do.	Top of cap over same	403.737	1324.594	Do.	Top of cap over same	403.809	1324.830
Do.	P. B. M. Cole.....	401.982	1318.836	Do.	T. B. M. 188.....	402.127	1319.312
Do.	P. B. M. Water Tank	413.719	1357.343	Do.	R. R. B. M.....	401.920	1318.632
Near Walker, Minn.	T. B. M. 69.....	404.002	1325.463	Near Nushka, Minn.	T. B. M. 189.....	399.103	1309.390
Do.	T. B. M. 71.....	398.958	1308.915	Nushka, Minn.	T. B. M. 191.....	399.205	1309.725
Do.	T. B. M. 72.....	397.688	1304.748	Near Nushka, Minn.	T. B. M. 192.....	402.658	1321.054
Do.	R. R. B. M.....	396.745	1301.655	Do.	Divide.....	402.199	1319.548
Near Leech Lake, Minn.	T. B. M. 73.....	405.220	1329.459	Do.	Top of cap over same	403.404	1323.501
Leech Lake, Minn.	P. B. M. Leech Lake.	405.956	1331.874	Do.	B. M. Mississippi*	397.590	1304.427
Do.	Top of cap over same	407.161	1335.827	Do.	Top of cap over same	398.798	1308.389
Near Leech Lake, Minn.	T. B. M. 77.....	400.500	1313.973	Near Ball Club, Minn.	U. S. E. B. M. 304..	393.994	1292.629
Near Wilkinson, Minn.	T. B. M. 78.....	399.153	1309.564	Do.	Top of cap over same	395.190	1296.553
Do.	T. B. M. 79.....	396.935	1302.278	Do.	B. M. Tomahawk...	396.803	1301.845
Do.	T. B. M. 80.....	397.488	1304.092	Do.	Top of cap over same	398.007	1305.794
Do.	T. B. M. 81.....	400.931	1315.388	Do.	B. M. Wigwam.....	392.571	1287.960
Do.	T. B. M. 82.....	396.402	1300.529	Do.	Top of cap over same	393.785	1291.943
Do.	T. B. M. 83.....	397.808	1305.142	Near Starke, Minn.	T. B. M. 15C.....	391.318	1283.849
Do.	P. B. M. Steamboat	397.780	1305.050	Do.	Starke.....	391.539	1284.575
Do.	Lake.....			Do.	Top of cap over same	392.752	1288.553
Do.	Top of cap over same	398.987	1309.010	Starke, Minn.	T. B. M. 200.....	393.426	1290.765
Do.	T. B. M. 85.....	400.081	1312.599	Near Starke, Minn.	T. B. M. 202.....	396.694	1301.487
Do.	T. B. M. 86.....	407.102	1335.633	Near Deer River, Minn.	T. B. M. 203.....	396.819	1301.897
Near Cass Lake, Minn.	T. B. M. 87.....	407.715	1337.645	Do.	Old Road.....	393.858	1292.183
Do.	T. B. M. 89.....	408.745	1341.024	Do.	Top of cap over same	395.067	1296.149
Do.	T. B. M. 90.....	405.728	1331.126	Deer River, Minn.	T. B. M. 206.....	393.834	1292.104
				Do.	Deer River.....	395.264	1296.795
Cass Lake, Minn.	P. B. M. Wye.....	405.629	1330.801	Do.	Top of cap over same	396.484	1300.798
Do.	Top of cap over same	405.844	1334.787	Do.	B. M. Roundhouse..	392.993	1289.345
Near Cass Lake, Minn.	T. B. M. 93.....	402.134	1319.334	Do.	Top of cap over same	394.192	1293.279
Near Farris, Minn.	T. B. M. 94.....	409.615	1343.878	Near Deer River, Minn.	U. S. E. B. M. 192..	391.196	1283.449
Do.	T. B. M. 97.....	412.837	1354.450	Do.	Top of cap over same	392.394	1287.380
Do.	P. B. M. Midge Lake.	404.525	1327.179	Do.	U. S. Engineer gauge.	390.299	1280.506
Do.	Top of cap over same	405.734	1331.146	Do.	T. B. M. 208.....	390.662	1281.697
Do.	T. B. M. 101.....	404.537	1327.219	Near Hull, Minn.	T. B. M. 210.....	391.900	1285.758
Near Rosby, Minn.	T. B. M. 102.....	405.859	1331.556	Do.	T. B. M. 212.....	400.421	1313.715
Do.	T. B. M. 103.....	407.951	1338.420	Do.	T. B. M. 213.....	390.662	1281.697
Near South Bemidji, Minn.	T. B. M. 105.....	411.090	1348.718	Near Cohasset, Minn.	B. M. Cohasset.....	390.019	1279.587
Do.	T. B. M. 107.....	414.146	1358.744	Do.	Top of cap over same	391.228	1283.554
Do.	T. B. M. 108.....	414.594	1360.214	Cohasset, Minn.	T. B. M. 215.....	390.608	1281.520
Near Bemidji, Minn.	Δ Bemidji.....	415.236	1362.320	Do.	U. S. E. B. M. 168..	389.438	1277.681
Do.	Top of cap over same	416.449	1366.299	Do.	Top of cap over same	390.633	1281.602
Bemidji, Minn.	T. B. M. 111.....	411.145	1348.898	Near Cohasset, Minn.	B. M. Dam.....	392.629	1288.150
Do.	P. B. M. Willets.....	413.841	1357.743	Do.	Top of cap over same	393.840	1292.123
Do.	Top of cap over same	415.052	1361.717	Near Pokegama Lake, Minn.	Old U. S. B. M.....	390.011	1279.561
Do.	P. B. M. Bemidji	414.886	1361.172				
Near Bemidji, Minn.	T. B. M. 114.....	416.290	1365.778				
Do.	P. B. M. Dorman.....	419.016	1374.722				
Do.	Top of cap over same	420.227	1378.695				
Do.	P. B. M. Collette.....	415.110	1361.906				
Do.	Top of cap over same	416.324	1365.889				
Near Maltby, Minn.	Δ County line.....	447.345	1467.665	Near Pokegama Lake, Minn.	U. S. E. B. M. 167..	389.691	1278.511
Do.	Top of cap over same	448.561	1471.654	Do.	Top of cap over same	390.890	1282.445
Near mouth of Hennepin River, Minn.	P. B. M. Hennepin..	421.376	1382.465	Pokegama Lake, Minn.	U. S. Engineer gauge.	389.806	1278.889
Do.	Top of cap over same	422.588	1386.441	Do.	U. S. Engineer gauge.	387.975	1272.881
Near "The Rapids," Minn.	P. B. M. Rapids.....	425.638	1396.448	Do.	U. S. Engineer gauge.	387.982	1272.904
Do.	Top of cap over same	426.849	1400.420	Near Grand Rapids, Minn.	Δ Grand Rapids.....	389.010	1276.277
Near mouth of La Salle River, Minn.	P. B. M. La Salle.....	430.911	1413.747	Do.	Top of cap over same	390.221	1280.250
Do.	Top of cap over same	432.123	1417.724	Do.	T. B. M. 220.....	392.549	1287.888
On Prospect Hill, Minn.	Δ Prospect Hill.....	512.016	1679.839	Do.	P. B. M. Balustrade..	392.962	1289.243
Do.	Top of cap over same	513.234	1683.835	Near Grand Rapids, Minn.	Δ Race track.....	389.012	1276.284
Near Lake Itasca, Minn.	P. B. M. Sherratt.....	453.267	1487.093	Do.	Top of cap over same	390.222	1280.254
Do.	Top of cap over same	454.480	1491.093	Do.	B. M. Grand Rapids	390.424	1280.916
				Do.	Top of cap over same	391.635	1284.889

*Moved by the railroad company in 1904; present elevation not determined.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near La Prairie, Minn.	P. B. M. Prairie River.	391.068	1283.029	Miller, Minn.	P. B. M. 14.	344.348	1129.742
Do.	La Prairie			Do.	P. B. M. 14A.	345.558	1133.718
Do.	Top of cap over same	391.089	1283.097	Sandstone Junction, Minn.	P. B. M. 15.	341.132	1119.197
Blackberry, Minn.	T. B. M. 226.	394.911	1295.637	Do.	P. B. M. 15A.	342.351	1125.198
Do.	T. B. M. 229.	396.989	1302.455	Hinckley, Minn.	P. B. M. 16.	313.770	1029.427
Do.	T. B. M. 230.	396.776	1301.756	Do.	P. B. M. 17.	314.058	1030.372
Do.	(B. M. Blackberry.)	395.949	1299.042	Do.	P. B. M. 17A.	315.278	1034.374
Do.	Top of cap over same	397.160	1303.015	Mission Creek, Minn.	P. B. M. 18.	300.670	986.448
				Do.	P. B. M. 18A.	301.871	989.455
Aitkin, Minn.	(P. B. M. 231.)	364.925	1197.258	Browns Hill, Minn.	P. B. M. 19.	296.720	973.489
Do.	Top of cap over same	366.136	1201.232	Do.	P. B. M. 19A.	297.939	977.489
Near Aitkin, Minn.	Lower Base	364.989	1197.468	Pine City, Minn.	P. B. M. 20.	289.176	948.738
Do.	Top of cap over same	366.133	1201.450	Do.	P. B. M. 21.	288.392	946.166
Do.	(B. M. 232.)	364.969	1197.402	Do.	P. B. M. 21A.	289.613	950.172
Do.	Top of cap over same	366.183	1201.385	Brook Creek, Minn.	P. B. M. 22.	284.762	935.191
Do.	(U. S. E. B. M. 202.)			Do.	P. B. M. 22A.	285.989	938.282
Do.	Top of cap over same	366.924	1203.817	Rush City, Minn.	P. B. M. 23.	279.128	915.772
Do.	P. B. M. Cut-off.	365.871	1200.361	Do.	P. B. M. 23A.	280.344	919.762
Do.	Top of cap over same	367.088	1204.356	Do.	P. B. M. 24.	281.272	919.296
Do.	P. B. M. Biggar.	366.144	1201.257	Harris, Minn.	P. B. M. 25.	273.632	897.741
Do.	Top of cap over same	367.358	1205.241	Do.	P. B. M. 25A.	274.544	901.718
Near Waldeck, Minn.	P. B. M. Sutton.	366.989	1204.031	North Branch, Minn.	P. B. M. 26.	272.586	894.309
Do.	Top of cap over same	368.209	1208.031	Do.	P. B. M. 27.	272.105	892.731
Do.	(U. S. E. B. M. 206.)	367.567	1205.925	Do.	P. B. M. 27A.	273.323	896.727
Do.	Top of cap over same	368.772	1209.880	Stacy, Minn.	P. B. M. 28.	271.609	891.104
Waldeck, Minn.	P. B. M. Waldeck.	367.875	1206.937	Do.	P. B. M. 28A.	272.824	895.090
Do.	Top of cap over same	369.087	1210.912	Wyoming, Minn.	P. B. M. 29.	270.511	887.501
Near Waldeck, Minn.	P. B. M. Fowlds.	368.212	1208.042	Do.	P. B. M. 29A.	271.728	891.495
Do.	Top of cap over same	369.428	1212.032	Forest Lake, Minn.	P. B. M. 30.	278.920	915.090
Do.	P. B. M. Strand.	368.808	1209.998	Do.	P. B. M. 31.	277.341	909.910
Do.	Top of cap over same	370.016	1213.962	Do.	P. B. M. 31A.	278.565	913.925
Near Portage, Minn.	P. B. M. Carlson.	373.339	1224.864	Do.	P. B. M. 32.	277.291	906.745
Do.	Top of cap over same	374.551	1228.840	Do.	P. B. M. 32A.	278.507	913.735
Do.	P. B. M. School.	372.495	1222.093	Centerville, Minn.	P. B. M. 33.	284.010	931.790
Do.	Top of cap over same	373.706	1226.068	Do.	P. B. M. 33A.	285.228	935.786
Do.	P. B. M. Pat.	370.855	1216.713	Bald Eagle Junction, Minn.	P. B. M. 34.	282.915	928.197
Do.	Top of cap over same	372.068	1220.693	Do.	P. B. M. 34A.	284.128	932.177
Near Libby, Minn.	P. B. M. Sandy.	371.461	1218.703	White Bear, Minn.	P. B. M. 35.	286.076	938.568
Do.	Top of cap over same	372.670	1222.667	Do.	P. B. M. 36.	285.094	935.849
Do.	(U. S. E. B. M.)	370.991	1217.160	Do.	P. B. M. 36A.	286.312	939.342
Do.	Top of cap over same	373.017	1223.808	Do.	P. B. M. 37.	285.100	935.156
Do.	P. B. M. Midway.	377.905	1239.842	Do.	P. B. M. 37A.	286.252	939.145
Do.	Top of cap over same	379.125	1243.847	Near White Bear, Minn.	P. B. M. 38.	282.143	925.664
Do.	P. B. M. Wells.	376.141	1234.057	Do.	P. B. M. 38A.	283.362	929.663
Do.	Top of cap over same	377.352	1238.029	Gladstone, Minn.	P. B. M. 185.	275.296	903.200
Do.	P. B. M. Stone.	376.803	1236.227	Do.	P. B. M. 39.	273.143	901.130
Near Mississippi, Minn.	Top of cap over same	378.016	1240.208	Do.	P. B. M. 39A.	274.360	900.130
Do.	P. B. M. Le Moon.	378.885	1243.060	Do.	P. B. M. 40.	272.718	894.742
Do.	Top of cap over same	380.098	1247.039	Do.	P. B. M. 40A.	273.928	898.712
Do.	P. B. M. Tiessen.	380.620	1248.750	St. Paul, Minn.	T. B. M. 193.	216.791	711.255
Do.	Top of cap over same	381.835	1252.737				
Do.	P. B. M. Vicinity.	382.482	1254.861	Jefferson City, Mo.	City B. M.	194.253	637.312
Do.	Top of cap over same	383.694	1258.835	Do.	T. B. M. 197.	191.382	627.892
Do.	P. B. M. Shep.	382.436	1254.709	Do.	P. B. M. 105.	170.657	559.897
Do.	Top of cap over same	383.648	1258.684	Do.	T. B. M. 199.	169.151	554.956
Near Verna, Minn.	P. B. M. Split Hand.	385.118	1263.507	Do.	T. B. M. 198=Old B. M. 90 (C).	165.174	541.908
Do.	Top of cap over same	386.335	1267.502	Do.	T. B. M. 200.	169.971	557.647
Near Blackberry, Minn.	P. B. M. Hamilton.	386.023	1266.478	Do.	T. B. M. 201=Old B. M. 90 (b).	166.213	545.317
Do.	Top of cap over same	387.239	1270.466	Do.	(P. B. M. 107=25.)	168.686	553.431
Do.	P. B. M. Five Pines.	390.317	1280.564	Do.	Top of cap over same	169.924	557.492
Do.	Top of cap over same	391.530	1284.545	Near Jefferson City, Mo.	T. B. M. 202.	170.796	560.353
Do.	P. B. M. Strawberry.	395.189	1296.550	Do.	P. B. M. 108.	168.513	552.863
Do.	Top of cap over same	396.404	1300.535	Do.	Top of cap over same	169.752	556.928
				Do.	T. B. M. 203=Old B. M.	169.034	554.572
Duluth, Minn.	B. M. 1 of U. S. Eng.	191.161	627.168	Do.	T. B. M. 204.	169.549	556.262
Do.	B. M. 19 of U. S. Eng.	185.235	607.725	Near Grays Creek, Mo.	P. B. M. 109.	171.736	563.437
Do.	B. M. 23 of U. S. Eng.	185.812	609.618	Do.	T. B. M. 205.	170.812	559.130
West Duluth, Minn.	B. M. Iron Bay Iron Works.	191.707	628.958	Do.	T. B. M. 206.	170.919	560.757
Near Duluth, Minn.	P. B. M. 1.	193.603	635.179	Grays Creek, Mo.	T. B. M. 207=Old R. R. B. M.	169.762	556.961
Do.	P. B. M. 1A.	194.815	639.155	Do.	(P. B. M. 110=24.)	171.849	563.808
Smithville, Minn.	P. B. M. 2.	214.300	703.082	Do.	Top of cap over same	173.092	567.886
Do.	P. B. M. 2A.	215.513	707.062	Near Grays Creek, Mo.	T. B. M. 209.	164.954	541.187
Short Line Park, Minn.	P. B. M. 3.	291.396	956.021	Do.	T. B. M. 213.	168.551	552.988
Do.	P. B. M. 3A.	292.613	960.014	Do.	P. B. M. 111.	169.271	555.350
Thomson, Minn.	P. B. M. 4.	326.346	1070.687	Do.	P. B. M. 112.	167.675	550.114
Do.	P. B. M. 4A.	327.558	1074.664	Do.	Top of cap over same	168.912	554.172
Carlton, Minn.	P. B. M. 5.	332.190	1089.860	Do.	(P. B. M. 113=24.)	171.625	563.073
Near Carlton, Minn.	P. B. M. 6.	339.414	1113.560	Do.	Top of cap over same	172.864	567.138
Do.	P. B. M. 6A.	340.628	1117.544	Near Stanleys Landing, Mo.	T. B. M. 218.	169.030	554.559
Near Barnum, Minn.	P. B. M. 7.	332.582	1091.146	Do.			
Do.	P. B. M. 7A.	333.801	1095.145	Sugar Loaf Rock, Mo.	P. B. M. 114.	173.585	569.503
Do.	P. B. M. 8.	355.317	1165.736	Do.	P. B. M. 115.	169.136	554.907
Do.	P. B. M. 8A.	356.527	1169.705	Near Marion, Mo.	Top of cap over same	170.374	558.969
Do.	P. B. M. 9.	360.217	1181.812	Do.	T. B. M. 220.	170.778	560.294
Do.	P. B. M. 9A.	361.440	1185.824	Near Bull Rock, Mo.	T. B. M. 223.	167.219	548.613
Moose Lake, Minn.	P. B. M. 10.	323.076	1059.958	Do.	P. B. M. 116.	168.888	554.412
Do.	P. B. M. 10A.	324.292	1063.948	Do.	(P. B. M. 117.)	174.332	571.954
Sturgeon Lake, Minn.	P. B. M. 11.	325.483	1067.855	Do.	Top of cap over same	175.569	576.013
Do.	P. B. M. 11A.	326.706	1071.808	Near Marion, Mo.	T. B. M. 224.	168.171	551.741
Willow River, Minn.	P. B. M. 12.	313.155	1027.409	Do.	T. B. M. 225.	167.216	548.608
Do.	P. B. M. 12A.	314.370	1031.396	Do.	T. B. M. 228.	169.780	557.020
Kettle River, Minn.	P. B. M. 13.	314.114	1030.556	Do.	(P. B. M. 118=24.)	174.949	573.979
Do.	P. B. M. 13A.	315.329	1034.542	Marion, Mo.	Top of cap over same	176.190	578.050

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Marion, Mo.	P. B. M. 119	170.894	560.675	Glasgow, Mo.	P. B. M. 159=4 ¹	188.247	617.607
Do.	T. B. M. 230	166.468	546.154	Do.	Top of cap over same	189.483	621.662
Near Marion, Mo.	T. B. M. 232	168.901	554.136	Do.	P. B. M. 160	194.264	637.348
Moniteau Creek, Mo.	P. B. M. 120	172.453	565.790	Do.	T. B. M. 314	191.897	629.582
Near Sandy Hook Land- ing, Mo.	Top of cap over same	173.694	569.861	Do.	T. B. M. 315=Old B. M. 141 (a).	187.093	613.821
Do.	T. B. M. 236	171.941	564.110	Near Glasgow, Mo.	P. B. M. 161	202.218	663.444
Sandy Hook Landing, Mo.	P. B. M. 121	170.941	560.829	Do.	P. B. M. 158=4 ¹	188.446	618.260
Do.	P. B. M. 122=4 ¹	177.132	581.141	Do.	Top of cap over same	189.684	622.322
Near Sandy Hook Land- ing, Mo.	Top of cap over same	178.373	585.212	Near Cambri, Mo.	P. B. M. 162	190.555	625.179
Do.	P. B. M. 123	172.734	566.711	Cambridge, Mo.	Top of cap over same	191.795	629.247
Near Geigers Landing, Mo.	T. B. M. 240	171.419	562.397	Do.	P. B. M. 163	194.344	637.610
Do.	T. B. M. 241	169.873	557.325	Do.	T. B. M. 325	193.706	635.517
Geigers Landing, Mo.	P. B. M. 124	177.166	581.252	Do.	P. B. M. 164=4 ¹	191.261	627.495
Do.	Top of cap over same	178.403	585.311	Do.	Top of cap over same	192.497	631.551
Do.	P. B. M. 125	175.386	575.412	Do.	T. B. M. 326	192.387	631.190
Do.	T. B. M. 242	173.684	569.828	Near Salt Creek, Mo.	P. B. M. 165	188.742	619.231
Near Geigers Landing, Mo.	T. B. M. 243	174.215	571.570	Do.	Top of cap over same	189.979	623.289
Do.	P. B. M. 126=4 ¹	176.430	578.837	New Frankfort, Mo.	P. B. M. 166=4 ¹	190.875	626.229
Near Wolf Point, Mo.	Top of cap over same	177.669	582.902	Do.	Top of cap over same	192.118	630.307
Do.	P. B. M. 127=4 ¹	178.932	587.046	Near New Frankfort, Mo.	P. B. M. 167	190.935	626.426
Wolf Point, Mo.	Top of cap over same	180.173	591.118	Do.	Top of cap over same	192.171	630.481
Do.	T. B. M. 250	177.077	580.960	Near Buckhorn Point, Mo.	P. B. M. 168=4 ¹	191.980	629.854
Do.	P. B. M. 128	184.662	605.845	Do.	Top of cap over same	193.221	633.926
Mount Vernon Landing, Mo.	P. B. M. 129	179.122	587.669	Do.	P. B. M. 169	192.895	632.856
Do.	Top of cap over same	180.358	591.725	Near Grand River, Mo.	Top of cap over same	194.135	636.925
Do.	T. B. M. 253	172.156	564.815	Do.	P. B. M. 170=4 ¹	193.517	634.897
Do.	P. B. M. 130	175.585	576.098	Do.	Top of cap over same	194.757	638.965
Near Terrapin Island, Mo.	P. B. M. 131=4 ¹	177.632	582.781	Near Dewitt, Mo.	P. B. M. 171=4 ¹	193.767	635.717
Do.	Top of cap over same	178.874	586.856	Do.	Top of cap over same	195.003	639.772
Near Rocheport, Mo.	P. B. M. 132	175.834	576.882	Near Miami, Mo.	P. B. M. 172	194.565	638.335
Do.	Top of cap over same	177.072	580.944	Do.	Top of cap over same	195.807	642.410
Near Overton, Mo.	P. B. M. 133=4 ¹	180.743	592.988	Do.	P. B. M. 173	195.682	642.000
Do.	Top of cap over same	181.986	597.066	Do.	T. B. M. 357=B. M. C. of 1878.	196.841	645.803
Near Boonville, Mo.	P. B. M. 134	179.614	589.294	Miami, Mo.	P. B. M. 175=4 ¹	196.412	644.395
Do.	P. B. M. 135	179.050	587.433	Do.	Top of cap over same	197.655	648.473
Near Elliotts Landing, Mo.	Top of cap over same	180.287	591.492	Do.	T. B. M. 358	197.574	648.207
Elliotts Landing, Mo.	P. B. M. 136	181.272	594.723	Near Miami, Mo.	P. B. M. 176	195.211	640.455
Do.	P. B. M. 137=4 ¹	182.238	597.892	Do.	T. B. M. 359	194.452	637.965
Do.	Top of cap over same	183.475	601.951	Do.	T. B. M. 360	198.239	650.389
Near Franklin Island, Mo.	T. B. M. 271	175.883	577.043	Do.	P. B. M. 177=4 ¹	196.023	643.119
Near Boonville, Mo.	P. B. M. 138	178.354	585.150	Do.	Top of cap over same	197.266	647.197
Do.	P. B. M. 139	177.316	581.744	Near Teteseau Bend, Mo.	P. B. M. 178	197.209	647.010
Do.	Top of cap over same	178.559	585.822	Do.	Top of cap over same	198.441	651.052
Do.	T. B. M. 276	178.382	585.242	Near Laynesville, Mo.	P. B. M. 179=4 ¹	198.482	651.186
Do.	P. B. M. 140=4 ¹	179.082	587.538	Do.	Top of cap over same	199.722	655.255
Do.	Top of cap over same	180.319	591.597	Malta Bend Landing, Mo.	P. B. M. 180	198.727	651.990
Boonville, Mo.	T. B. M. 279	182.710	599.441	Do.	Top of cap over same	199.967	656.058
Do.	Highwater mark, 1844 (Main Street).	182.532	598.857	Near Malta Bend Landing, Mo.	P. B. M. 181	199.431	654.300
Do.	P. B. M. 141=Old B. M. 121.	178.824	586.692	Do.	Top of cap over same	200.670	658.365
Do.	U. S. Signal Service gauge.	172.460	565.813	Near Waverly, Mo.	P. B. M. 182=4 ¹	200.751	658.631
Do.	Highwater mark, 1844 (bridge).	182.469	598.650	Do.	Top of cap over same	201.994	662.709
Do.	P. B. M. 141	181.774	596.370	Do.	P. B. M. 183	205.351	673.722
Do.	P. B. M. 142=40 ¹ Boonville.	181.569	595.698	Do.	Top of cap over same	206.590	677.787
Do.	Top of cap over same	182.811	599.772	Do.	T. B. M. 389	204.782	671.856
Do.	T. B. M. 280	186.161	610.763	Do.	P. B. M. 184=4 ¹	200.900	659.119
Do.	P. B. M. 143	186.162	610.766	Do.	Top of cap over same	202.141	663.191
Do.	P. B. M. 145	185.294	607.919	Do.	T. B. M. 392	207.025	679.215
Do.	P. B. M. 146	180.865	593.391	Do.	P. B. M. 185=4 ¹	208.627	684.470
Near Franklin, Mo.	Top of cap over same	182.108	597.466	Waverly, Mo.	Top of cap over same	209.874	688.562
Do.	P. B. M. 147=4 ¹	181.804	596.469	Near Waverly, Mo.	P. B. M. 186	204.919	672.305
Near Boonville, Mo.	(new position).	183.040	600.524	Do.	T. B. M. 396	206.335	676.951
Do.	T. B. M. 286	183.856	603.201	Do.	P. B. M. 187	205.794	675.176
Do.	P. B. M. 148	182.994	600.373	Do.	T. B. M. 397	206.338	676.961
Do.	Top of cap over same	184.233	604.438	Do.	P. B. M. 188	205.610	674.572
Near Lisbon, Mo.	P. B. M. 149	184.260	604.526	Do.	Top of cap over same	206.846	678.627
Do.	Top of cap over same	185.497	608.585	Do.	P. B. M. 189=4 ¹	212.573	697.417
Do.	P. B. M. 150	183.554	602.210	Near Edwards, Mo.	Top of cap over same	213.813	701.485
Do.	P. B. M. 151=4 ¹	188.898	619.743	Do.	P. B. M. 190	209.376	686.928
Do.	Top of cap over same	190.137	623.808	Do.	T. B. M. 402	208.842	685.176
Do.	T. B. M. 295	183.602	602.368	Edwards, Mo.	P. B. M. 191	208.160	682.938
Do.	P. B. M. 152=4 ¹	187.199	614.169	Do.	P. B. M. 192	205.527	674.300
Do.	Top of cap over same	188.439	618.237	Do.	Top of cap over same	206.770	78.378
Do.	T. B. M. 297	188.481	618.375	Do.	T. B. M. 403	206.735	678.263
Do.	P. B. M. 153	184.986	606.908	Near Dover, Mo.	P. B. M. 193=4 ¹	207.501	680.776
Do.	T. B. M. 300	184.986	606.908	Do.	Top of cap over same	208.741	684.844
Do.	P. B. M. 154=4 ¹	183.999	605.291	Do.	T. B. M. 407	207.518	680.832
Do.	Top of cap over same	184.193	604.307	Do.	T. B. M. 408	208.174	682.984
Do.	T. B. M. 301	184.390	604.953	Do.	P. B. M. 194	206.407	677.187
Do.	T. B. M. 302	185.145	607.430	Dover, Mo.	Top of cap over same	207.647	681.255
Do.	T. B. M. 303	187.539	615.284	Do.	P. B. M. 195=4 ¹	207.982	682.354
Near Bluffport, Mo.	T. B. M. 304	186.330	611.318	Berlin, Mo.	Top of cap over same	209.217	686.406
Do.	P. B. M. 155	186.404	611.560	Do.	P. B. M. 196	208.751	684.877
Near Richland Creek, Mo.	Top of cap over same	187.643	615.625	Do.	T. B. M. 411	209.377	686.931
Near Bluffport, Mo.	P. B. M. 156	188.903	619.759	Near Northrup, Mo.	P. B. M. 197	207.845	681.905
Near Richland Creek, Mo.	T. B. M. 305	188.522	618.509	Do.	T. B. M. 412	208.107	682.764
Do.	P. B. M. 157=4 ¹	186.084	610.511	Do.	P. B. M. 198	209.960	688.844
Near Glasgow, Mo.	Top of cap over same	187.322	614.572	Northrup, Mo.	Top of cap over same	211.195	692.896
Do.	T. B. M. 309	186.036	610.353	Near Northrup, Mo.	T. B. M. 415	210.786	691.554
				Do.	P. B. M. 199=4 ¹	206.135	676.295
				Near Lexington, Mo.	Top of cap over same	207.380	680.379
				Do.	T. B. M. 419	211.846	695.031
				Do.	P. B. M. 200	212.242	694.311
				Do.	T. B. M. 420	214.713	704.438
				Do.	P. B. M. 201	213.025	698.900
				Do.	Top of cap over same	214.265	702.968

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Lexington, Mo.	P. B. M. 202	212.034	695.648	Near Pomeroy, Kans.	P. B. M. 241	230.378	755.832
Do	T. B. M. 422	210.452	690.458	Do	Top of cap over same	231.615	759.890
Lexington, Mo.	P. B. M. 203=4 ^a	209.670	687.892	Pomeroy, Kans.	P. B. M. 242	236.160	774.802
Do	Top of cap over same	210.910	691.961	Do	P. B. M. 243	229.549	753.112
Do	T. B. M. 423	211.050	692.439	Near Pomeroy, Kans.	Top of cap over same	230.782	757.157
Do	P. B. M. 204	209.613	687.705	Do	P. B. M. 244=Old	235.855	773.801
Do	T. B. M. 424	211.391	686.875	Do	B. M. 260	229.711	753.643
Do	P. B. M. 205=Old	219.389	719.779	Do	T. B. M. 499	229.711	753.643
Near Lexington, Mo.	B. M. 190			Connors, Kans.	P. B. M. 245=4 ^a	229.848	754.421
Do	T. B. M. 425=Old	212.239	696.321	Do	Top of cap over same	231.190	758.496
Do	B. M. 191			Do	P. B. M. 246	235.193	771.629
Do	P. B. M. 206	211.396	693.555	Near Connors, Kans.	P. B. M. 247	230.355	755.428
Do	P. B. M. 207	211.054	692.433	Do	Top of cap over same	231.499	759.477
Do	Top of cap over same	212.295	696.505	Popes, Kans.	T. B. M. 506	232.157	761.668
Near Wellington, Mo.	P. B. M. 208	212.360	696.718	Near Leavenworth Junction, Kans.	P. B. M. 248=4 ^a	231.622	759.283
Do	Top of cap over same	213.593	700.763	Do	Top of cap over same	244.885	805.361
Do	T. B. M. 429=Old	212.271	696.426	Leavenworth Junction, Kans.	P. B. M. 249	230.499	756.229
Do	B. M. 194			Do	Top of cap over same	231.738	760.294
Do	P. B. M. 209=4 ^a	214.390	703.378	Near Leavenworth, Kans.	T. B. M. 513	232.574	763.037
Wellington, Mo.	Top of cap over same	215.634	707.459	Do	T. B. M. 514	234.797	770.330
Do	P. B. M. 210	218.336	716.324	Do	P. B. M. 250=4 ^a	236.181	807.679
Do	T. B. M. 431	219.163	719.037	Do	Top of cap over same	247.420	811.744
Near Waterloo, Mo.	P. B. M. 211	212.033	695.645	Do	T. B. M. 515	233.826	767.144
Do	Top of cap over same	213.269	699.700	Leavenworth, Kans.	P. B. M. 251	238.257	781.681
Napoleon, Mo.	P. B. M. 212=4 ^a	215.412	706.731	Do	P. B. M. 252	239.781	786.517
Do	Top of cap over same	216.653	710.802	Do	T. B. M. 516=Old	234.375	768.443
Near Napoleon, Mo.	T. B. M. 436	219.508	720.169	Do	B. M. 270		
Do	P. B. M. 213	215.347	706.518	Do	P. B. M. 253	236.157	774.792
Do	Top of cap over same	216.584	710.576	Do	T. B. M. 517	235.061	771.196
Near Sibley Bridge, Mo.	P. B. M. 214=4 ^a	216.623	710.704	Near Leavenworth, Kans.	T. B. M. 518	237.218	778.273
Matthews Landing, Mo.	Top of cap over same	217.863	714.772	Do	P. B. M. 254=4 ^a	240.063	787.603
Do	T. B. M. 445=Old	218.620	717.256	Fort Leavenworth, Kans.	Top of cap over same	241.308	791.691
Do	B. M. 210			Do	P. B. M. 255	240.301	788.059
Near Sibley, Mo.	P. B. M. 215	217.937	715.015	Do	T. B. M. 520	238.250	781.629
Do	Top of cap over same	219.172	719.067	Do	T. B. M. 521=gauge	239.326	785.189
Sibley, Mo.	P. B. M. 216	227.413	746.104	Do	B. M.		
Near Sibley, Mo.	P. B. M. 217=Cap over 4 ^a	215.926	708.417	Do	P. B. M. 256	239.390	775.556
Near New Sibley, Mo.	P. B. M. 218	217.328	713.017	Near Fort Leavenworth, Kans.	P. B. M. 257	235.579	772.808
Do	Top of cap over same	218.561	717.062	Do	Top of cap over same	236.818	776.960
Do	T. B. M. 457	222.957	731.485	Do	P. B. M. 258=4 ^a	234.311	768.735
Little Blue River, Mo.	T. B. M. 458	223.600	733.594	Near Wade, Kans.	Top of cap over same	235.554	772.813
Near Missouri City, Mo.	P. B. M. 219=4 ^a	218.354	716.383	Do	T. B. M. 528	235.697	773.283
Do	Top of cap over same	219.597	720.461	Near Kickapoo, Kans.	P. B. M. 259	235.713	773.356
Atherton, Mo.	F. B. M. 220	222.205	729.018	Do	Top of cap over same	236.950	777.393
Do	Top of cap over same	223.442	733.076	Do	P. B. M. 260	242.023	794.037
Near Atherton, Mo.	F. B. M. 221	224.557	736.734	Do	T. B. M. 529=Old	242.147	794.444
Blue Mills Landing, Mo.	P. B. M. 221	224.557	736.734	Do	B. M. 278		
Do	Top of cap over same	225.790	740.779	Do	T. B. M. 530	241.576	792.571
Do	T. B. M. 465	227.767	747.266	Kickapoo, Kans.	P. B. M. 261=4 ^a	244.125	800.953
Do	T. B. M. 466=Old	223.238	732.407	Do	Top of cap over same	245.363	804.995
Do	B. M. 53 of 1878			Do	T. B. M. 531	242.801	796.590
Do	T. B. M. 467=Old	220.739	724.208	Near Oak Mills, Kans.	P. B. M. 262	235.916	774.001
Do	B. M. 228			Do	Top of cap over same	237.147	778.040
Courtney, Mo.	P. B. M. 222	223.283	732.554	Oak Mills, Kans.	P. B. M. 263	240.710	789.729
Do	Top of cap over same	224.514	736.593	Do	P. B. M. 264=4 ^a	237.879	780.441
Near Courtney, Mo.	T. B. M. 470	226.109	741.826	Do	Top of cap over same	239.119	784.510
Near Independence, Mo.	T. B. M. 471	229.721	753.676	Near Oak Mills, Kans.	P. B. M. 265	239.240	784.907
Do	P. B. M. 223=4 ^a	223.266	732.499	Do	Top of cap over same	240.471	788.945
Do	Top of cap over same	224.508	736.573	Do	T. B. M. 540	239.370	785.333
Wayne, Mo.	P. B. M. 224	227.420	746.127	Near Atchison, Kans.	P. B. M. 266=4 ^a	239.011	784.155
Near Wayne, Mo.	P. B. M. 225	223.041	748.165	Do	Top of cap over same	240.238	788.181
Do	Top of cap over same	229.277	752.220	Do	T. B. M. 542	240.064	787.610
Near Independence, Mo.	P. B. M. 226	226.506	743.128	Do	P. B. M. 267	242.520	795.701
Do	P. B. M. 227	223.895	734.562	Do	Top of cap over same	243.758	799.762
Near Kansas City, Mo.	Top of cap over same	225.132	738.621	Do	T. B. M. 543	240.714	789.743
Do	P. B. M. 228=4 ^a	223.807	734.273	Do	P. B. M. 268=Old	243.447	795.709
Do	Top of cap over same	225.048	738.348	Do	B. M. 287		
Kansas City, Mo.	T. B. M. 478=Old	226.127	741.885	Atchison, Kans.	P. B. M. 269=4 ^a	243.190	797.866
Do	B. M. 240			Do	Top of cap over same	244.416	801.898
Do	T. B. M. 479	228.062	748.233	Do	T. B. M. 548=City	244.190	801.147
Do	P. B. M. 229	228.228	748.778	Do	B. M.		
Do	T. B. M. 480=Old	233.540	766.206	Do	P. B. M. 270	255.680	838.873
Do	B. M. 242			Do	T. B. M. 549	254.948	836.442
Do	P. B. M. 230=4 ^a	227.376	745.983	Do	T. B. M. 550=Old	250.982	790.622
Do	Top of cap over same	228.621	750.067	Do	gauge B. M.		
Do	T. B. M. 481	229.352	752.466	Do	P. B. M. 271	243.289	798.191
Do	P. B. M. 233	228.726	750.412	Do	P. B. M. 272	242.551	795.769
Do	T. B. M. 482	227.859	747.567	Do	T. B. M. 551	243.026	797.328
Do	P. B. M. 234	229.527	753.040	Near East Atchison, Mo.	P. B. M. 273=4 ^a	238.519	782.541
Kansas City, Kans.	T. B. M. 483	228.262	748.890	Do	Top of cap over same	239.749	786.577
Do	P. B. M. 235	225.997	741.458	Near Rushville, Mo.	P. B. M. 274	240.186	788.010
Do	T. B. M. 484	225.465	739.713	Do	Top of cap over same	241.418	792.052
Do	T. B. M. 485=Old	236.971	777.462	Rushville, Mo.	P. B. M. 275=4 ^a	245.712	806.140
Do	B. M. 248			Do	Top of cap over same	246.941	810.172
Do	T. B. M. 486=City	237.236	778.332	Near Halls, Mo.	P. B. M. 276=4 ^a	245.604	805.746
Do	B. M.			Do	Top of cap over same	246.836	809.828
Do	T. B. M. 487	232.393	762.443	Halls, Mo.	P. B. M. 277	243.196	797.886
Do	P. B. M. 236	228.402	749.349	Do	Top of cap over same	244.433	801.944
Do	Top of cap over same	229.640	753.411	Near Kenmoor, Mo.	P. B. M. 278=4 ^a	243.284	817.597
Do	P. B. M. 237	229.264	752.177	Do	Top of cap over same	250.433	821.629
Near Quindaro, Kans.	P. B. M. 238=4 ^a	227.538	746.514	Near St. Joseph, Mo.	P. B. M. 279	243.408	805.136
Do	Top of cap over same	228.779	750.586	Do	Top of cap over same	243.648	809.211
Do	T. B. M. 492	235.587	772.922	Do	P. B. M. 280=4 ^a	251.444	824.946
Near Nearman, Kans.	P. B. M. 239	227.678	746.974	Do	Top of cap over same	252.670	828.968
Do	Top of cap over same	228.909	751.012	St. George, Mo.	P. B. M. 281	251.187	824.103
Near Pomeroy, Kans.	P. B. M. 240	230.957	757.731	Do	Top of cap over same	252.421	828.151
Do	T. B. M. 495	230.957	757.731				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
St. Joseph, Mo.	T. B. M. 580.....	251.823	826.189	Near McPaul, Iowa.	P. B. M. 330= $\frac{1}{2}$	283.879	931.360
Do.	P. B. M. 282.....	249.978	820.136	Do.	Top of cap over same	285.096	935.352
Do.	T. B. M. 582=Old	250.949	823.322	Do.	P. B. M. 331.....	285.560	936.875
Do.	B. M. 313.....			Do.	Top of cap over same	286.784	940.890
Do.	T. B. M. 583=Old	250.728	822.597	Near Bartlett, Iowa.	P. B. M. 332.....	285.991	938.289
Do.	B. M. 312.....			Do.	Top of cap over same	287.215	942.305
Do.	P. B. M. 283= $\frac{1}{2}$	249.882	819.821	Do.	P. B. M. 333.....	286.986	941.553
Do.	Top of cap over same	251.108	823.843	Do.	Top of cap over same	288.211	945.572
Do.	P. B. M. 284.....	253.660	832.216	Near Haynies, Iowa.	P. B. M. 334= $\frac{1}{2}$	287.898	944.545
Do.	T. B. M. 584.....	252.773	829.306	Do.	Top of cap over same	289.119	948.551
Do.	P. B. M. 285.....	266.463	874.221	Haynies, Iowa.	P. B. M. 335.....	288.860	947.702
Do.	P. B. M. 286.....	256.356	841.061	Do.	Top of cap over same	290.083	951.714
Do.	T. B. M. 585=City	255.113	836.983	Near Pacific Junction, Iowa.	P. B. M. 336= $\frac{1}{2}$	289.414	949.519
Do.	B. M.			Do.	Top of cap over same	290.639	953.538
Do.	T. B. M. 586.....	252.352	827.925	Do.	P. B. M. 337.....	291.049	954.883
Near St. Joseph, Mo.	P. B. M. 287=804.....	248.922	816.672	Do.	Top of cap over same	292.272	958.896
Do.	Top of cap over same	250.142	820.674	Near Hentons, Iowa.	P. B. M. 338.....	291.998	957.997
Do.	P. B. M. 288.....	247.585	812.285	Do.	Top of cap over same	293.225	962.022
Do.	Top of cap over same	248.818	816.330	Hentons, Iowa.	P. B. M. 339.....	293.285	962.219
Do.	T. B. M. 589.....	249.872	819.788	Do.	Top of cap over same	294.507	966.228
Do.	P. B. M. 289.....	250.858	823.023	Near Hentons, Iowa.	P. B. M. 340.....	295.357	969.017
Do.	P. B. M. 290= $\frac{1}{2}$	249.911	819.916	Do.	Top of cap over same	296.580	973.030
Do.	Top of cap over same	251.101	823.821	Near Island Park, Iowa.	P. B. M. 341.....	294.961	967.718
Near Amazonia, Mo.	P. B. M. 291.....	254.476	834.893	Do.	Top of cap over same	296.186	971.737
Do.	Top of cap over same	255.702	838.916	Near Council Bluffs, Iowa.	P. B. M. 342.....	295.797	970.461
Do.	P. B. M. 292= $\frac{1}{2}$	252.896	829.710	Do.	Top of cap over same	297.020	974.473
Do.	Top of cap over same	254.108	833.686	Council Bluffs, Iowa.	P. B. M. 343.....	299.010	981.002
Do.	P. B. M. 293.....	252.002	826.777	Omaha, Nebr.	City B. M., Omaha.	317.288	1040.969
Do.	Top of cap over same	253.227	830.796	Do.	P. B. M. 344.....	316.972	1039.932
Do.	P. B. M. 294= $\frac{1}{2}$	253.926	833.089	Do.	P. B. M. 345.....	299.155	981.475
Do.	Top of cap over same	255.136	837.059	Do.	P. B. M. 346=gauge	296.158	971.648
Near Nodaway, Mo.	P. B. M. 295.....	253.504	831.704	Do.	B. M.		
Do.	P. B. M. 296= $\frac{1}{2}$	257.048	843.332	Near Omaha, Nebr.	Top of cap over same	297.367	975.612
Do.	Top of cap over same	258.259	847.305	Council Bluffs, Iowa.	T. B. M. 804.....	306.609	1005.933
Near Forbes, Mo.	P. B. M. 297.....	255.524	838.332	Do.	P. B. M. 347.....	300.707	986.570
Do.	Top of cap over same	256.730	842.288	Do.	P. B. M. 348= $\frac{1}{2}$	301.856	990.339
Do.	P. B. M. 298= $\frac{1}{2}$	256.500	853.899	Do.	Top of cap over same	303.080	994.355
Do.	Top of cap over same	261.474	857.853	Do.	P. B. M. 349= $\frac{1}{2}$	297.291	975.362
Near Curzons, Mo.	P. B. M. 299.....	257.378	844.414	Do.	Top of cap over same	298.515	979.378
Do.	Top of cap over same	258.608	848.450	Near Council Bluffs, Iowa.	P. B. M. 350.....	303.464	995.615
Do.	P. B. M. 300= $\frac{1}{2}$	258.304	847.452	Do.	Top of cap over same	304.685	999.621
Near Forest City, Mo.	Top of cap over same	259.517	851.432	Do.	P. B. M. 351.....	300.759	986.740
Do.	T. B. M. 632.....	260.247	853.827	Do.	Top of cap over same	301.983	990.756
Do.	P. B. M. 301= $\frac{1}{2}$	262.677	861.799	Crescent, Iowa.	P. B. M. 352.....	301.277	988.440
Do.	Top of cap over same	263.887	865.769	Do.	Top of cap over same	302.502	992.459
Forest City, Mo.	P. B. M. 302.....	261.593	858.243	Near Honey Creek, Iowa.	P. B. M. 353.....	303.611	996.097
Near Forest City, Mo.	P. B. M. 303.....	258.877	849.332	Do.	Top of cap over same	304.833	1000.106
Do.	Top of cap over same	260.101	853.348	Honey Creek, Iowa.	P. B. M. 354.....	306.266	1004.808
Napier, Mo.	P. B. M. 304.....	257.983	846.399	Near Honey Creek, Iowa.	P. B. M. 355.....	304.996	1000.641
Do.	Top of cap over same	259.214	850.438	Do.	Top of cap over same	306.221	1004.660
Near Bigelow, Mo.	P. B. M. 305.....	258.447	847.922	Loveland, Iowa.	P. B. M. 356.....	304.837	1000.119
Do.	Top of cap over same	259.672	851.941	Near Missouri Valley, Iowa.	P. B. M. 357.....	303.275	994.995
Bigelow, Mo.	P. B. M. 306.....	258.298	854.322	Do.	Top of cap over same	304.498	999.007
Do.	Top of cap over same	261.625	858.348	Missouri Valley, Iowa.	P. B. M. 358.....	306.766	1006.448
Near Bigelow, Mo.	P. B. M. 307.....	261.069	856.524	Do.	P. B. M. 359.....	305.299	1001.635
Do.	Top of cap over same	262.298	860.556	Near Missouri Valley, Iowa.	Top of cap over same	306.524	1005.054
Near Craig, Mo.	P. B. M. 308.....	263.149	863.676	Do.	P. B. M. 360= $\frac{1}{2}$	305.555	1002.475
Do.	P. B. M. 309.....	263.310	863.876	Near California Junction, Iowa.	Top of cap over same	306.776	1006.481
Do.	Top of cap over same	264.534	867.892	Do.	P. B. M. 361.....	306.414	1005.293
Near Corning, Mo.	P. B. M. 310.....	264.011	866.176	Do.	Top of cap over same	307.637	1009.306
Do.	P. B. M. 311.....	264.182	866.737	Near Modale, Iowa.	P. B. M. 362.....	307.466	1008.745
Corning, Mo.	Top of cap over same	265.410	870.766	Do.	Top of cap over same	308.683	1012.737
Near Corning, Mo.	P. B. M. 312.....	266.642	874.808	Do.	P. B. M. 363.....	307.886	1010.123
Do.	P. B. M. 313.....	266.370	873.916	Do.	Top of cap over same	309.108	1014.132
Do.	Top of cap over same	267.592	877.925	Near Mondamin, Iowa.	P. B. M. 364.....	309.006	1013.797
Nishnabotna, Mo.	P. B. M. 314.....	268.195	872.587	Do.	Top of cap over same	310.230	1017.813
Near Nishnabotna, Mo.	Top of cap over same	267.191	876.009	Mondamin, Iowa.	P. B. M. 365.....	312.433	1025.041
Do.	P. B. M. 315.....	268.200	883.200	Near Mondamin, Iowa.	P. B. M. 366.....	311.507	1022.003
Near Langdon, Mo.	P. B. M. 316.....	268.965	882.429	Do.	Top of cap over same	312.727	1026.005
Do.	Top of cap over same	270.191	886.452	Do.	P. B. M. 367= $\frac{1}{2}$	311.051	1020.506
Near Phelps, Mo.	P. B. M. 317.....	269.539	884.313	Do.	Top of cap over same	312.268	1024.499
Do.	Top of cap over same	270.766	888.338	Near River Sioux, Iowa.	P. B. M. 368.....	312.680	1025.851
Phelps, Mo.	P. B. M. 318= $\frac{1}{2}$	270.448	887.285	Do.	Top of cap over same	313.901	1029.857
Do.	Top of cap over same	271.671	891.307	Do.	P. B. M. 369= $\frac{1}{2}$	314.550	1031.986
Near Watson, Mo.	P. B. M. 319.....	271.098	889.427	Do.	Top of cap over same	315.768	1035.982
Do.	Top of cap over same	272.325	893.453	Do.	P. B. M. 370.....	313.616	1028.922
Do.	P. B. M. 320= $\frac{1}{2}$	273.220	896.359	Do.	Top of cap over same	314.837	1032.928
Do.	Top of cap over same	274.442	900.398	Near Blencoe, Iowa.	P. B. M. 371.....	314.290	1031.133
Watson, Mo.	P. B. M. 321.....	272.557	894.247	Do.	Top of cap over same	315.510	1035.136
Do.	Top of cap over same	273.790	898.259	Do.	P. B. M. 372= $\frac{1}{2}$	314.533	1031.930
Near Watson, Mo.	P. B. M. 322.....	274.812	901.612	Do.	Top of cap over same	315.204	1034.132
Do.	Top of cap over same	276.039	905.638	Do.	P. B. M. 373.....	316.424	1038.134
Near Hamburg, Iowa.	P. B. M. 323.....	276.859	908.328	Do.	Top of cap over same	316.148	1037.229
Do.	P. B. M. 324.....	275.240	903.017	Do.	P. B. M. 374= $\frac{1}{2}$	317.364	1041.218
Do.	Top of cap over same	276.468	907.045	Near Onawa, Iowa.	P. B. M. 375.....	317.684	1042.268
Do.	P. B. M. 325= $\frac{1}{2}$	276.006	905.530	Do.	Top of cap over same	318.910	1046.291
Do.	Top of cap over same	277.222	909.519	Do.	P. B. M. 376.....	318.368	1044.512
Near Nebraska City Junction, Iowa.	P. B. M. 326.....	279.160	915.877	Do.	Top of cap over same	319.594	1048.535
Do.	Top of cap over same	280.386	919.900	Onawa, Iowa.	P. B. M. 377.....	320.783	1052.436
Do.	P. B. M. 327.....	280.314	919.664	Do.	P. B. M. 378= $\frac{1}{2}$	319.328	1047.662
Do.	Top of cap over same	281.541	923.689	Do.	Top of cap over same	320.567	1051.727
Near Percival, Iowa.	P. B. M. 328.....	281.691	920.162	Near Onawa, Iowa.	P. B. M. 379.....	319.508	1048.252
Do.	Top of cap over same	282.904	924.181	Do.	Top of cap over same	320.727	1052.252
Percival, Iowa.	P. B. M. 329.....	282.304	926.192	Near Whiting, Iowa.	P. B. M. 380.....	320.402	1051.186
Do.	Top of cap over same	283.532	930.221	Do.	Top of cap over same	321.629	1055.211

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Whiting, Iowa	P. B. M. 381	322.192	1057.058	Near Vineyard Station, Pa.	P. R. R. No. 71	171.622	563.063
Do	Top of cap over same	323.433	1061.130	Do	P. R. R. No. 72	178.175	584.562
Do	P. B. M. 382	323.224	1060.444	Near Newton Hamilton, Pa.	P. R. R. No. 73	179.821	589.953
Near Sloan, Iowa	Top of cap over same	324.448	1064.460	Newton Hamilton, Pa.	P. R. R. No. 74	182.631	599.182
Do	P. B. M. 383-1 st	323.950	1062.836	Near Mount Union, Pa.	P. R. R. No. 75	183.396	601.528
Do	Top of cap over same	325.188	1066.888	Mount Union, Pa.	P. R. R. No. 76	183.011	600.429
Sloan, Iowa	P. B. M. 384	325.550	1068.075	Near Mount Union, Pa.	P. R. R. No. 77	177.558	582.538
Do	Top of cap over same	326.770	1072.078	Jackstown, Pa.	P. R. R. No. 78	180.974	593.746
Near Sloan, Iowa	P. B. M. 385	328.155	1076.622	Mapleton, Pa.	P. R. R. No. 79	181.938	597.007
Do	P. B. M. 386-1 st	328.022	1069.624	Vandevanders Bridge, Pa.	P. R. R. No. 80	183.159	600.914
Near Salix, Iowa	Top of cap over same	327.243	1073.630	Bridgeport, Pa.	P. R. R. No. 81	183.147	600.875
Do	P. B. M. 387	326.003	1071.825	Mill Creek, Pa.	P. R. R. No. 82	184.865	606.511
Do	Top of cap over same	327.920	1075.851	Do	P. R. R. No. 83	183.230	601.213
Do	P. B. M. 388	328.794	1078.718	Near Mill Creek, Pa.	P. R. R. No. 84	183.591	602.331
Do	Top of cap over same	330.014	1082.721	Ardenheim, Pa.	P. R. R. No. 85	183.901	603.249
Do	P. B. M. 389	330.877	1085.552	Near Ardenheim, Pa.	P. R. R. No. 86	189.214	620.799
Near Sargents Bluff, Iowa	Top of cap over same	332.098	1089.558	Huntingdon, Pa.	P. R. R. No. 87	190.347	624.369
Sargents Bluff, Iowa	P. B. M. 390	330.787	1085.257	Do	P. R. R. No. 88	190.347	624.369
Do	Top of cap over same	332.011	1089.273	Near Warrior Ridge, Pa.	P. R. R. No. 89	200.906	659.543
Do	P. B. M. 391-1 st	332.316	1090.273	Warrior Ridge, Pa.	P. R. R. No. 90	205.881	675.461
Near Sargents Bluff, Iowa	Top of cap over same	333.532	1094.263	Near Petersburg, Pa.	P. R. R. No. 91	207.457	680.632
Do	P. B. M. 392	333.159	1093.039	Petersburg, Pa.	P. R. R. No. 92	211.029	692.351
Near Sargents Bluff, Iowa	Top of cap over same	334.383	1097.055	Near Petersburg, Pa.	P. R. R. No. 93	211.394	693.744
Do	P. B. M. 393	334.681	1098.033	Do	P. R. R. No. 94	213.232	699.579
Do	Top of cap over same	335.908	1102.058	Do	P. R. R. No. 95	219.554	720.820
Do	P. B. M. 394	337.009	1105.670	Near Barree, Pa.	P. R. R. No. 96	222.160	728.890
Do	T. B. M. 966	337.875	1108.512	Do	P. R. R. No. 97	231.355	759.037
Harrisburg, Pa.	P. R. R. No. 1	97.518	319.940	Do	P. R. R. No. 98	231.934	760.937
Do	P. R. R. No. 2	102.734	337.053	Near Union Furnace, Pa.	P. R. R. No. 99	238.591	782.777
Do	364 Harrisburg 1899	110.884	363.792	Do	P. R. R. No. 100	239.682	786.357
Do	P. R. R. No. 4	101.124	331.771	Union Furnace, Pa.	P. R. R. No. 101	243.338	798.745
Near Rockville, Pa.	P. R. R. No. 5	106.464	349.291	Near Union Furnace, Pa.	P. R. R. No. 102	250.325	821.275
Do	P. R. R. No. 6	106.501	349.412	Shoenberger, Pa.	P. R. R. No. 103	255.506	838.273
Near Perdix, Pa.	P. R. R. No. 7	105.266	345.360	Near Birmingham, Pa.	P. R. R. No. 104	261.101	857.944
Perdix, Pa.	P. R. R. No. 8	106.082	348.037	Birmingham, Pa.	P. R. R. No. 105	264.102	866.471
Cove, Pa.	P. R. R. No. 9	105.170	345.045	Near Birmingham, Pa.	P. R. R. No. 106	270.599	887.700
Near Cove, Pa.	P. R. R. No. 10	106.231	348.526	Near Tyrone, Pa.	P. R. R. No. 107	271.425	890.200
Do	P. R. R. No. 11	105.762	346.987	Tyrone, Pa.	P. R. R. No. 108	273.040	895.799
Cove Creek, Pa.	P. R. R. No. 12	107.152	351.548	Do	P. R. R. No. 109	277.554	910.608
Shermans Creek, Pa.	P. R. R. No. 13	108.275	355.232	Near Tyrone, Pa.	P. R. R. No. 110	281.010	921.947
Duncannon, Pa.	P. R. R. No. 14	111.884	367.073	Do	P. R. R. No. 111	284.711	934.089
Juniata Bridge, Pa.	P. R. R. No. 15	109.503	359.261	Near Grazierville, Pa.	P. R. R. No. 112	287.411	942.948
Near Juniata Bridge, Pa.	P. R. R. No. 16	110.625	362.942	Do	P. R. R. No. 113	289.740	950.589
Near Aqueduct, Pa.	P. R. R. No. 17	113.654	372.880	Tipton, Pa.	P. R. R. No. 114	302.730	993.207
Alters Run Bridge, Pa.	P. R. R. No. 18	113.127	371.151	Near Fostoria, Pa.	P. R. R. No. 115	313.163	1027.436
Loshs Run, Pa.	P. R. R. No. 19	114.971	377.201	Bellwood, Pa.	P. R. R. No. 116	323.708	1062.032
Near Loshs Run, Pa.	P. R. R. No. 20	113.791	373.329	Near Bellwood, Pa.	P. R. R. No. 117	322.525	1058.151
Bailey, Pa.	P. R. R. No. 21	117.558	385.688	Elizabeth Furnace, Pa.	P. R. R. No. 118	327.768	1075.352
Near Bailey, Pa.	P. R. R. No. 22	117.204	384.527	Near Elizabeth Furnace, Pa.	P. R. R. No. 119	335.214	1099.781
Trimmers Rock, Pa.	P. R. R. No. 23	120.483	395.285	Blair Furnace, Pa.	P. R. R. No. 120	340.742	1117.918
Near Newport, Pa.	P. R. R. No. 24	119.620	392.453	Near Blair Furnace, Pa.	P. R. R. No. 121	345.226	1132.629
Newport, Pa.	P. R. R. No. 25	120.098	394.022	Haggerty Run, Pa.	P. R. R. No. 122	348.103	1142.068
Near Newport, Pa.	P. R. R. No. 26	120.744	396.141	Altoona, Pa.	P. R. R. No. 123	353.939	1161.215
Do	P. R. R. No. 27	120.899	396.649	Do	P. R. R. No. 124	354.378	1162.655
Near Old Ferry Station, Pa.	P. R. R. No. 28	122.374	401.489	Do	P. R. R. No. 125	356.612	1169.985
Do	P. R. R. No. 29	122.069	400.488	Do	P. R. R. No. 126	359.987	1181.057
Millerstown, Pa.	P. R. R. No. 30	124.699	409.117	Do	P. R. R. No. 127	363.233	1191.805
Near Durward, Pa.	P. R. R. No. 31	125.031	410.206	Kittanning Point, Pa.	P. R. R. No. 128	495.655	1626.161
Durward, Pa.	P. R. R. No. 32	128.822	422.644	Allegrippus, Pa.	P. R. R. No. 129	500.808	1645.357
Near Durward, Pa.	P. R. R. No. 33	128.399	421.223	Bennington, Pa.	P. R. R. No. 130	618.930	2030.606
Thompsonstown, Pa.	P. R. R. No. 34	128.029	420.042	Allegheny Tunnel, Pa.	P. R. R. No. 131	648.102	2126.351
Near Thompsonstown, Pa.	P. R. R. No. 35	127.617	418.690	Gallitzin, Pa.	P. R. R. No. 132	659.761	2164.566
Do	P. R. R. No. 36	128.065	420.160	Cresson, Pa.	P. R. R. No. 133	616.216	2021.702
Vandyke, Pa.	P. R. R. No. 37	129.729	425.619	Near Lilly, Pa.	P. R. R. No. 134	594.462	1950.331
Near Vandyke, Pa.	P. R. R. No. 38	129.778	425.780	Lilly, Pa.	P. R. R. No. 135	575.716	1888.828
Tuscarora, Pa.	P. R. R. No. 39	131.060	429.986	Portage, Pa.	P. R. R. No. 136	514.249	1687.165
Mexico, Pa.	P. R. R. No. 40	130.770	429.035	Near Portage, Pa.	P. R. R. No. 137	494.799	1623.353
Near Port Royal, Pa.	P. R. R. No. 41	131.874	432.657	Wilmore, Pa.	P. R. R. No. 138	476.301	1562.664
Port Royal, Pa.	P. R. R. No. 42	134.373	440.855	Near Wilmore, Pa.	P. R. R. No. 139	475.124	1558.803
Near Mifflin, Pa.	P. R. R. No. 43	134.866	442.473	Near Ehrenfeld, Pa.	P. R. R. No. 140	476.209	1562.362
Mifflin, Pa.	P. R. R. No. 44	135.527	444.641	Ehrenfeld, Pa.	P. R. R. No. 141	463.023	1519.101
Near Mifflin, Pa.	P. R. R. No. 45	136.218	446.902	Near Ehrenfeld, Pa.	P. R. R. No. 142	452.296	1483.908
Denholm, Pa.	P. R. R. No. 46	138.272	453.647	Conemaugh Viaduct, Pa.	P. R. R. No. 143	444.274	1457.589
Near Denholm, Pa.	P. R. R. No. 47	141.902	465.557	Mineral Point, Pa.	P. R. R. No. 144	431.802	1415.778
Near Narrows Station, Pa.	P. R. R. No. 48	142.038	466.003	Near Mineral Point, Pa.	P. R. R. No. 145	404.332	1326.546
Do	P. R. R. No. 49	144.342	471.562	Do	P. R. R. No. 146	399.507	1310.716
Bixler Water Station, Pa.	P. R. R. No. 50	145.144	476.193	Near Conemaugh, Pa.	P. R. R. No. 147	373.930	1226.802
Lewistown Junction, Pa.	P. R. R. No. 51	151.898	498.352	Conemaugh, Pa.	P. R. R. No. 148	361.262	1185.240
Mayes Bridge, Pa.	P. R. R. No. 52	152.275	499.589	Woodvale, Pa.	P. R. R. No. 149	361.969	1187.560
Grandville, Pa.	P. R. R. No. 53	150.492	493.739	Do	P. R. R. No. 150	359.735	1180.231
Anderson, Pa.	P. R. R. No. 54	150.217	492.837	Near Sang Hollow, Pa.	P. R. R. No. 151	349.874	1147.878
Near Longfellow Station, Pa.	P. R. R. No. 55	151.548	497.204	Sang Hollow, Pa.	P. R. R. No. 152	348.810	1144.387
Near Horingford Station, Pa.	P. R. R. No. 56	152.419	500.061	Near Big Spring Run, Pa.	P. R. R. No. 153	343.381	1126.576
Do	P. R. R. No. 57	159.563	523.500	Big Spring Run, Pa.	P. R. R. No. 154	333.536	1094.276
McVeytown, Pa.	P. R. R. No. 58	160.154	525.439	Piney Run, Pa.	P. R. R. No. 155	332.703	1091.543
Near McVeytown, Pa.	P. R. R. No. 59	154.223	505.980	Near New Florence, Pa.	P. R. R. No. 156	329.386	1080.661
Do	P. R. R. No. 60	154.302	506.239	Do	P. R. R. No. 157	327.106	1073.180
Near Ryde, Pa.	P. R. R. No. 61	155.679	510.757	New Florence, Pa.	P. R. R. No. 158	329.245	1080.198
Ryde, Pa.	P. R. R. No. 62	157.047	515.245	Near Lockport, Pa.	P. R. R. No. 159	317.751	1042.488
Near Ryde, Pa.	P. R. R. No. 63	162.540	533.267	Do	P. R. R. No. 160	320.280	1050.785
Manayunk Bridge, Pa.	P. R. R. No. 64	164.085	538.336	Lockport, Pa.	P. R. R. No. 161	321.508	1054.814
				Bolivar Junction, Pa.	P. R. R. No. 162	314.826	1032.892

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Bolivar Junction, Pa.	P. R. R. No. 44	315.582	1035.372	Near Halifax, Pa.	P. R. R. No. 13	113.956	373.871
Do	P. R. R. No. 44a	315.698	1035.753	Do	P. R. R. No. 14	115.087	377.581
Near Bolivar, Pa.	P. R. R. No. 45	330.798	1085.293	Do	P. R. R. No. 15	114.771	376.545
Pack Saddle, Pa.	P. R. R. No. 46	336.881	1105.250	Do	P. R. R. No. 16	115.539	379.064
Do	P. R. R. No. 46a	337.405	1106.970	Do	P. R. R. No. 17	115.153	377.798
Blairsville Intersection, Pa.	P. R. R. No. 47	341.288	1119.709	Do	P. R. R. No. 18	114.635	376.098
Near Blairsville, Pa.	P. R. R. No. 48	339.466	1113.731	Do	P. R. R. No. 19	118.519	388.841
Millwood, Pa.	P. R. R. No. 51	355.262	1165.555	Near Millersburg, Pa.	P. R. R. No. 20	120.239	394.484
Near Millwood, Pa.	P. R. R. No. 52	350.611	1150.296	Do	P. R. R. No. 21	119.164	390.957
Derry, Pa.	P. R. R. No. 53	356.217	1168.689	Do	P. R. R. No. 22	120.386	394.966
Do	P. R. R. No. 54	360.292	1182.058	Near Liverpool, Pa.	P. R. R. No. 23	121.509	398.651
Bradenville, Pa.	P. R. R. No. 56	331.011	1085.992	Liverpool, Pa.	P. R. R. No. 24	120.680	395.931
Do	P. R. R. No. 56a	330.740	1085.103	Near Liverpool, Pa.	P. R. R. No. 25	121.196	397.624
Loyalhanna, Pa.	P. R. R. No. 57	316.777	1039.293	Do	P. R. R. No. 26	122.480	401.836
Latrobe, Pa.	P. R. R. No. 58	307.375	1008.446	Do	P. R. R. No. 26a	122.895	403.198
Do	P. R. R. No. 58a	301.386	988.797	Mahantongo, Pa.	P. R. R. No. 27	122.398	401.567
Near Latrobe, Pa.	P. R. R. No. 59	324.231	1063.748	Near Mahantongo, Pa.	P. R. R. No. 28	122.567	402.122
Beatty, Pa.	P. R. R. No. 60	328.328	1077.189	Near Georgetown, Pa.	P. R. R. No. 29	123.829	406.262
Carney, Pa.	P. R. R. No. 61	351.442	1153.023	Do	P. R. R. No. 30	125.887	413.014
Near Carney, Pa.	P. R. R. No. 62	368.678	1209.571	Do	P. R. R. No. 31	126.649	415.514
George, Pa.	P. R. R. No. 63	365.552	1199.315	Do	P. R. R. No. 32	125.187	410.718
Greensburg, Pa.	P. R. R. No. 65	330.973	1085.867	Do	P. R. R. No. 32a	126.385	414.648
Do	P. R. R. No. 66	339.398	1113.508	Do	P. R. R. No. 33	126.693	415.659
Radebaugh, Pa.	P. R. R. No. 67	354.194	1162.051	Do	P. R. R. No. 34	127.398	417.972
Do	P. R. R. No. 68	354.996	1164.683	Near Herndon, Pa.	P. R. R. No. 35	127.993	419.924
Do	P. R. R. No. 68a	352.819	1157.540	Do	P. R. R. No. 36	127.929	419.714
Do	P. R. R. No. 69	349.637	1147.101	Do	P. R. R. No. 36a	127.835	419.405
Do	P. R. R. No. 69a	347.717	1140.802	Herndon, Pa.	P. R. R. No. 37	130.384	427.768
Near Grapeville, Pa.	P. R. R. No. 70	336.238	1103.141	Near Herndon, Pa.	P. R. R. No. 38	129.385	424.491
Grapeville, Pa.	P. R. R. No. 71	322.953	1059.555	Do	P. R. R. No. 39	131.418	431.161
Penn, Pa.	P. R. R. No. 72	296.750	973.587	Do	P. R. R. No. 40	131.517	431.485
Near Penn, Pa.	P. R. R. No. 72a	299.889	983.886	Fishers Ferry, Pa.	P. R. R. No. 41	131.517	431.485
Near Manor, Pa.	P. R. R. No. 73	288.697	947.167	Near Selinsgrove Jct., Pa.	P. R. R. No. 42	133.109	438.708
Irwin, Pa.	P. R. R. No. 76a	267.951	879.103	Do	P. R. R. No. 43	133.268	437.230
Near Larimer, Pa.	P. R. R. No. 77a	262.788	862.164	Selinsgrove Junction, Pa.	P. R. R. No. 44	132.079	433.329
Ardara, Pa.	P. R. R. No. 78	254.678	835.556	Near Selinsgrove Jct., Pa.	P. R. R. No. 45	132.946	436.174
Moss Side, Pa.	P. R. R. No. 81	242.620	793.207	Do	P. R. R. No. 46	134.440	441.075
Wall, Pa.	P. R. R. No. 82	228.653	751.419	Near Sunbury, Pa.	P. R. R. No. 47	134.687	441.886
Turtle Creek, Pa.	P. R. R. No. 84	228.351	749.182	Do	P. R. R. No. 48	134.234	440.399
Brinton, Pa.	P. R. R. No. 85	229.254	752.144	Sunbury, Pa.	P. R. R. No. 49	134.496	441.259
Do	P. R. R. No. 86	230.629	756.655	Do	P. R. R. No. 50	135.545	444.701
Near West Penn Jct., Pa.	P. R. R. No. 27	237.774	780.097	Near Sunbury, Pa.	P. R. R. No. 1	135.475	444.471
Near Bagdad, Pa.	P. R. R. No. 28	236.351	775.428	Do	P. R. R. No. 2	135.469	444.451
Do	P. R. R. No. 29	239.089	784.411	Near Northumberland, Pa.	P. R. R. No. 3	137.737	451.892
Near Leechburg, Pa.	P. R. R. No. 30	237.356	778.725	Do	P. R. R. No. 4	137.567	451.334
Leechburg, Pa.	P. R. R. No. 31	240.505	789.057	Do	P. R. R. No. 5	138.244	453.556
Near Leechburg, Pa.	P. R. R. No. 32	237.753	780.028	Do	P. R. R. No. 6	137.672	451.679
Near Hyde Park, Pa.	P. R. R. No. 33	242.463	795.481	Do	P. R. R. No. 7	137.251	450.298
Near Vandergrift, Pa.	P. R. R. No. 34	247.280	811.284	Near Kapps, Pa.	P. R. R. No. 8	138.559	454.589
Vandergrift, Pa.	P. R. R. No. 35	244.166	801.068	Do	P. R. R. No. 9	139.157	456.551
Near Vandergrift, Pa.	P. R. R. No. 36	243.295	798.210	Do	P. R. R. No. 10	137.231	450.232
Near Paulton, Pa.	P. R. R. No. 37	245.707	806.124	Near Montandon, Pa.	P. R. R. No. 11	137.570	451.344
Do	P. R. R. No. 38	246.744	809.526	Do	P. R. R. No. 12	137.970	452.657
Do	P. R. R. No. 39	250.094	820.517	Montandon, Pa.	P. R. R. No. 13	139.916	459.041
Near Roaring Run, Pa.	P. R. R. No. 40	251.945	826.590	Near Montandon, Pa.	P. R. R. No. 14	141.108	462.952
Do	P. R. R. No. 41	252.377	828.007	Do	P. R. R. No. 15	142.239	466.662
Near Salina, Pa.	P. R. R. No. 42	254.507	834.995	Near Dougal, Pa.	P. R. R. No. 16	142.721	468.244
Do	P. R. R. No. 43	253.066	830.267	Milton, Pa.	P. R. R. No. 17	145.182	476.318
Do	P. R. R. No. 44	257.486	844.769	Near Milton, Pa.	P. R. R. No. 18	144.274	473.339
Do	P. R. R. No. 45	257.285	844.109	Do	P. R. R. No. 19	142.799	468.500
Near Edri, Pa.	P. R. R. No. 46	256.322	840.950	Near Watsonstown, Pa.	P. R. R. No. 20	143.236	469.933
Do	P. R. R. No. 47	254.366	834.532	Do	P. R. R. No. 21	143.614	471.174
Do	P. R. R. No. 48	256.492	841.507	Watsonstown, Pa.	P. R. R. No. 22	148.150	486.055
Near Saltsburg, Pa.	P. R. R. No. 49	256.297	840.868	Do	P. R. R. No. 23	147.678	484.507
Saltsburg, Pa.	P. R. R. No. 50	260.772	855.549	Near Watsonstown, Pa.	P. R. R. No. 24	147.078	482.538
Near White Rock, Pa.	P. R. R. No. 51	265.649	872.206	Near Dewart, Pa.	P. R. R. No. 25	147.304	483.280
Near Tunnelton, Pa.	P. R. R. No. 52	264.283	867.068	Do	P. R. R. No. 26	149.509	490.514
Near Bow, Pa.	P. R. R. No. 53	274.734	901.356	Near Montgomery, Pa.	P. R. R. No. 27	148.452	487.046
Do	P. R. R. No. 54	275.603	904.207	Do	P. R. R. No. 28	149.190	489.468
Near Livermore, Pa.	P. R. R. No. 55	281.306	922.918	Do	P. R. R. No. 29	147.538	484.048
Do	P. R. R. No. 56	284.526	933.482	Montgomery, Pa.	P. R. R. No. 30	150.565	493.979
Near Social Hall, Pa.	P. R. R. No. 57	293.363	962.475	Do	P. R. R. No. 31	149.859	491.662
Social Hall, Pa.	P. R. R. No. 58	293.888	964.198	Near Montgomery, Pa.	P. R. R. No. 32	152.810	501.344
Near Blairsville, Pa.	P. R. R. No. 59	304.898	999.362	Near Muncy, Pa.	P. R. R. No. 33	153.941	502.055
Blairsville, Pa.	P. R. R. No. 60	308.425	1011.891	Do	P. R. R. No. 34	156.106	512.158
Near Blairsville, Pa.	P. R. R. No. 61	298.420	979.066	Do	P. R. R. No. 35	156.552	513.621
Do	P. R. R. No. 62	294.940	967.648	Do	P. R. R. No. 36	155.952	511.653
Near Bolivar Junction, Pa.	P. R. R. No. 63	295.890	1003.594	Do	P. R. R. No. 37	157.227	515.836
Near Hecks, Pa.	P. R. R. No. 1	105.520	346.194	Near Loyalsock, Pa.	P. R. R. No. 38	157.614	517.105
Hecks, Pa.	P. R. R. No. 1a	106.038	347.893	Do	P. R. R. No. 39	158.042	516.509
Near Dauphin, Pa.	P. R. R. No. 2	105.668	346.679	Do	P. R. R. No. 40	157.353	516.249
Do	P. R. R. No. 3	106.376	349.002	Do	P. R. R. No. 41	158.052	518.542
Do	P. R. R. No. 4	105.931	347.542	Do	P. R. R. No. 42	158.208	519.054
Near Geiger Point, Pa.	P. R. R. No. 5	106.898	350.715	Near Williamsport, Pa.	P. R. R. No. 43	156.983	515.035
Near Clarks Ferry, Pa.	P. R. R. No. 6	106.478	349.337	Do	P. R. R. No. 44	159.321	522.706
Do	P. R. R. No. 7	107.402	352.368	Do	P. R. R. No. 45	160.044	525.078
Do	P. R. R. No. 8	111.185	364.779	Williamsport, Pa.	P. R. R. No. 45a	159.252	522.479
Do	P. R. R. No. 9	111.469	365.711	Do	P. R. R. No. 46	160.079	528.244
Do	P. R. R. No. 10	113.170	371.292	Do	P. R. R. No. 46a	161.009	528.244
Do	P. R. R. No. 11	111.628	366.353	Do	P. R. R. No. 47	161.088	528.503
Do	P. R. R. No. 12	112.537	369.215	Washington, D. C.	P. R. R. No. 139A	3.242	10.636
Near Inglenook, Pa.	P. R. R. No. 12a	113.806	373.379	Do	B. & O. No. 2	12.572	41.247
				Eckington, D. C.	B. & O. No. 3	29.104	95.485
				Near Brookland, D. C.	B. & O. No. 3A	32.750	107.447

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Brookland, D. C.	B. & O. No. 4.	39.366	129.153	Near Sleepy Creek, W. Va.	B. & O. No. 93.	122.301	401.249
Near Brookland, D. C.	B. & O. No. 5.	48.972	160.649	Do.	B. & O. No. 94.	123.683	405.783
Stotts, D. C.	B. & O. No. 6.	62.378	204.652	Do.	B. & O. No. 95.	124.038	406.948
Near Takoma Park, D. C.	B. & O. No. 7.	81.359	266.925	Near Hancock, W. Va.	B. & O. No. 96.	123.462	405.058
Near Silver Spring, Md.	B. & O. No. 8.	99.844	327.572	Do.	B. & O. No. 97.	124.688	408.981
Near Woodside, Md.	B. & O. No. 9.	98.563	323.369	Hancock, W. Va.	B. & O. No. 97A.	127.220	417.388
Near Linden, Md.	B. & O. No. 10.	97.586	320.163	Near Hancock, W. Va.	B. & O. No. 98.	127.634	418.746
Near Capitol View, Md.	B. & O. No. 11.	94.386	309.665	Do.	B. & O. No. 99.	127.168	417.217
Kensington, Md.	B. & O. No. 12.	91.655	300.705	Near Round Top, W. Va.	B. & O. No. 100.	126.676	415.603
Near Garrett Park, Md.	B. & O. No. 13.	87.028	285.524	Round Top, W. Va.	B. & O. No. 101.	130.037	426.630
Near Windham, Md.	B. & O. No. 14.	96.992	318.215	Near Round Top, W. Va.	B. & O. No. 102.	129.958	426.371
Near Halpine, Md.	B. & O. No. 15.	113.603	372.713	Near Sir Johns Run, W. Va.	B. & O. No. 103.	129.523	424.943
Do.	B. & O. No. 16.	120.042	393.838	Do.	B. & O. No. 104.	130.058	426.599
Near Rockville, Md.	B. & O. No. 17.	128.530	421.686	Do.	B. & O. No. 105.	130.028	426.600
Near Westmore, Md.	B. & O. No. 18.	134.806	442.276	Near Great Cacapon, W. Va.	B. & O. No. 106.	132.995	436.334
Do.	B. & O. No. 19.	139.375	457.266	Do.	B. & O. No. 107.	132.775	435.613
Derwood, Md.	B. & O. No. 20.	144.952	475.563	Do.	B. & O. No. 108.	138.068	452.978
Near Washington Grove, Md.	B. & O. No. 21.	151.534	497.158	Do.	B. & O. No. 109.	137.293	450.435
Near Gaithersburg, Md.	B. & O. No. 22.	158.138	518.824	Near Woodmont, W. Va.	B. & O. No. 110.	138.431	454.169
Near Ward, Md.	B. & O. No. 23.	149.556	490.668	Near Lineburg, W. Va.	B. & O. No. 111.	138.061	454.214
Do.	B. & O. No. 24.	136.020	446.259	Do.	B. & O. No. 112.	142.860	468.729
Near Clopper, Md.	B. & O. No. 25.	123.253	404.373	Near Orleans Road, W. Va.	B. & O. No. 113.	148.697	487.850
Waring, Md.	B. & O. No. 26.	111.074	364.415	Do.	B. & O. No. 114.	153.704	504.277
Near Germantown, Md.	B. & O. No. 27.	121.889	399.897	Near Rockwells Run, W. Va.	B. & O. No. 115.	159.412	523.004
Do.	B. & O. No. 28.	134.762	442.132	Do.	B. & O. No. 116.	166.620	546.652
Near Darby, Md.	B. & O. No. 29.	128.801	422.575	Near Doe Gully, W. Va.	B. & O. No. 117.	165.829	544.057
Near Boyd, Md.	B. & O. No. 30.	127.122	417.066	Near Doe Gully, W. Va.	B. & O. No. 118.	158.468	519.465
Near Buck Lodge, Md.	B. & O. No. 31.	131.629	431.853	Near Hansrotte, W. Va.	B. & O. No. 119.	150.638	494.218
Do.	B. & O. No. 32.	134.603	441.610	Do.	B. & O. No. 120.	151.756	497.880
Near Barnesville, Md.	B. & O. No. 33.	150.855	494.930	Do.	B. & O. No. 121.	151.682	497.643
Do.	B. & O. No. 34.	155.125	508.939	Near Baird, W. Va.	B. & O. No. 122.	149.320	489.894
Do.	B. & O. No. 35.	138.022	452.827	Do.	B. & O. No. 123.	150.594	494.074
Near Dickerson, Md.	B. & O. No. 36.	120.990	396.948	Near Magnolia, W. Va.	B. & O. No. 124.	151.678	497.400
Do.	B. & O. No. 37.	104.948	344.317	Do.	B. & O. No. 125.	153.033	502.076
Do.	B. & O. No. 38.	86.700	284.448	Do.	B. & O. No. 126.	155.912	511.521
Near Tuscarora, Md.	B. & O. No. 39.	77.678	254.849	Do.	B. & O. No. 127.	157.346	516.226
Do.	B. & O. No. 40A.	68.913	226.992	Do.	B. & O. No. 128.	160.524	526.652
Do.	B. & O. No. 41.	69.112	227.745	Near Paw Paw, W. Va.	B. & O. No. 129.	162.784	534.067
Do.	B. & O. No. 42.	69.137	226.827	Do.	B. & O. No. 130.	162.176	532.072
Near Washington Jct., Md.	B. & O. No. 43.	71.356	234.107	Near Little Cacapon, W. Va.	B. & O. No. 131.	161.194	528.851
Washington Jct., Md.*	B. & O. No. 44A.	71.066	233.156	Do.	B. & O. No. 132.	160.952	528.057
Near Catoclin, Md.	B. & O. No. 45.	72.621	238.257	Near Okonoko, W. Va.	B. & O. No. 133.	162.909	534.477
Catoclin, Md.	B. & O. No. 46.	72.868	239.068	Do.	B. & O. No. 134.	164.095	538.368
Near Catoclin, Md.	B. & O. No. 47.	73.958	242.644	Do.	B. & O. No. 135.	163.703	537.082
Do.	B. & O. No. 48.	74.896	245.721	Near French, W. Va.	B. & O. No. 136.	164.832	540.786
Near Brunswick, Md.	B. & O. No. 49.	75.452	247.545	Do.	B. & O. No. 137.	168.861	554.005
Do.	B. & O. No. 50.	75.503	247.713	Do.	B. & O. No. 138.	169.536	556.219
Do.	B. & O. No. 51.	76.330	250.426	Near Green Spring, W. Va.	B. & O. No. 139.	168.230	551.935
Near Knoxville, Md.	B. & O. No. 52.	79.105	259.530	Do.	B. & O. No. 140.	170.456	559.238
Knoxville, Md.	B. & O. No. 53.	78.652	258.044	Do.	B. & O. No. 141.	171.321	562.076
Near Weverton, Md.	B. & O. No. 54.	78.665	258.087	Do.	B. & O. No. 142.	170.590	559.677
Do.	B. & O. No. 55.	80.261	263.323	Near Dans Run, W. Va.	B. & O. No. 143.	172.167	564.851
Do.	B. & O. No. 56.	85.426	280.268	Do.	B. & O. No. 144.	172.480	565.878
Harpers Ferry, W. Va.	B. & O. No. 56A.	87.000	285.432	Near Patterson Creek Cut-off, W. Va.	B. & O. No. 145.	172.997	567.574
Near Harpers Ferry, W. Va.	B. & O. No. 57.	88.641	290.816	Patterson Creek Cut-off, W. Va.	B. & O. No. 145A.	173.412	568.636
Near Engle, W. Va.	B. & O. No. 58.	94.470	309.940	Do.	574 Patterson Creek.	174.896	573.805
Do.	B. & O. No. 59.	108.127	354.747	Near Patterson Creek, W. Va.	B. & O. No. 146.	175.310	575.163
Do.	B. & O. No. 60.	117.818	386.541	Do.	B. & O. No. 147.	182.364	598.303
Do.	B. & O. No. 61.	125.342	411.226	Near North Branch, Md.	B. & O. No. 147A.	183.647	602.515
Near Duffields, W. Va.	B. & O. No. 62.	134.385	440.895	Near North Branch, Md.	B. & O. No. 148.	190.554	625.176
Duffields, W. Va.	B. & O. No. 63.	147.606	484.271	Do.	B. & O. No. 149.	194.175	637.056
Near Shenandoah Junction, W. Va.	B. & O. No. 64.	161.738	530.635	Near Evitts Creek, Md.	B. & O. No. 150.	191.850	629.428
Do.	B. & O. No. 65.	170.787	560.324	Do.	B. & O. No. 151.	194.595	638.434
Near Hobbs, W. Va.	B. & O. No. 66.	177.982	583.929	Near Cumberland, Md.	B. & O. No. 152.	197.550	648.129
Near Kernysville, W. Va.	B. & O. No. 67.	172.034	564.415	Do.	B. & O. No. 153.	192.817	632.600
Do.	B. & O. No. 68.	161.044	528.359	Do.	B. & O. No. 153A.	195.000	639.762
Near Van Clevessville, W. Va.	B. & O. No. 69.	151.652	497.545	Do.	B. & O. No. 154.	196.395	644.339
Do.	B. & O. No. 70.	145.721	478.086	Near Cumberland, Md.	B. & O. No. 155.	199.166	653.430
Do.	B. & O. No. 71.	137.343	450.599	Do.	B. & O. No. 156.	200.010	656.199
Do.	B. & O. No. 72.	123.119	403.933	Near Mount Savage Junction, Md.	B. & O. No. 157.	207.712	681.468
Near Opequon, W. Va.	B. & O. No. 73.	117.062	384.061	Mount Savage Jct., Md.	B. & O. No. 158.	216.543	710.441
Near Martinsburg, W. Va.	B. & O. No. 74.	121.717	399.333	Do.	B. & O. No. 160A.	221.886	727.971
Do.	B. & O. No. 75.	131.952	432.913	Ellerslie, Md.	B. & O. No. 160B.	225.977	741.393
Do.	B. & O. No. 76.	143.153	469.661	Near Ellerslie, Md.	B. & O. No. 161A.	228.373	749.254
Do.	B. & O. No. 77.	149.431	490.258	Do.	B. & O. No. 163A.	237.552	779.369
Near Tabb, W. Va.	B. & O. No. 78.	160.654	527.079	Do.	B. & O. No. 165A.	256.497	841.524
Do.	B. & O. No. 79.	159.300	522.337	Near Hyndman, Pa.	B. & O. No. 167A.	275.471	903.774
Do.	B. & O. No. 80.	157.918	518.103	Do.	P. R. R. No. 6.	288.123	944.204
Near N. Mountain, W. Va.	B. & O. No. 81.	154.515	506.984	Do.	B. & O. No. 168A.	291.983	957.948
Do.	B. & O. No. 82.	160.903	527.896	Near Hoblitzell, Pa.	B. & O. No. 170.	333.644	1094.630
Do.	B. & O. No. 83.	161.078	528.470	Do.	B. & O. No. 171.	359.612	1179.827
Do.	B. & O. No. 84.	153.655	504.116	Williams, Pa.	B. & O. No. 172.	382.198	1253.928
Near Back Creek, W. Va.	B. & O. No. 85.	140.769	461.840	Near Fairhope, Pa.	B. & O. No. 173.	405.420	1330.115
Do.	B. & O. No. 86.	129.967	426.400	Do.	B. & O. No. 174.	427.150	1401.408
Near Cherry Run, W. Va.	B. & O. No. 87.	119.371	391.636	Do.	B. & O. No. 174A.	440.047	1443.721
Do.	B. & O. No. 88.	117.298	384.835	Near Foley, Pa.	B. & O. No. 175.	457.038	1499.465
Do.	B. & O. No. 89.	120.883	396.597	Foley, Pa.	B. & O. No. 176.	465.151	1526.083
Near Miller, W. Va.	B. & O. No. 90.	123.242	404.336				
Do.	B. & O. No. 91.	120.793	396.302				
Near Sleepy Creek, W. Va.	B. & O. No. 92.	121.672	399.186				
Sleepy Creek, W. Va.	B. & O. No. 92A.	120.567	395.795				

* Called Point of Rocks in the description of the bench mark, p. 730, Appendix No. 3, Report for 1903.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Valley Falls, W. Va.	986 Pittsburgh	300.243	985.047	Near Terral, Okla.	B.....	253.300	831.035
Near Powells, W. Va.	899 Pittsburgh	273.861	898.492	Near Ryan, Okla.	827 Ryan	252.230	827.525
Bentons Ferry, W. Va.	885 Pittsburgh	269.610	884.545	Do.	C.....	252.070	827.000
Near Fairmont, W. Va.	885 Pittsburgh	269.600	884.513	Near Sugden, Okla.	Geol. Sugden	257.392	844.480
Near Catawba, W. Va.	873 Pittsburgh	265.818	872.105	Do.	844 Sugden	257.359	844.352
Near Little Falls, W. Va.	859 Pittsburgh	261.636	858.384	Sugden, Okla.	D.....	258.411	847.803
Uffington, W. Va.	821 Pittsburgh	252.208	827.452	Near Sugden, Okla.	875 Boundary	266.666	874.887
Morgantown, W. Va.	821 Pittsburgh	250.075	820.454	Near Addington, Okla.	883 Addington	269.326	883.614
Do.	U. S. E.	250.072	820.445	Do.	E.....	277.359	909.969
Near Van Vorhis, W. Va.	815 Pittsburgh	248.359	814.824	Addington, Okla.	918 Addington	279.793	917.954
Near Point Marion, Pa.	813 Pittsburgh	247.659	812.528	Near Addington, Okla.	F.....	283.617	930.500
Near Outcrop, Pa.	1084 Pittsburgh	330.254	1083.508	Near Comanche, Okla.	G.....	295.002	975.852
Fairchance, Pa.	1065 Pittsburgh	324.576	1064.880	Comanche, Okla.	H.....	300.770	986.776
Uniontown, Pa.	999 Pittsburgh	304.361	998.558	Near Comanche, Okla.	I.....	309.852	1016.573
Near Upper Middletown, Pa.	920 Pittsburgh	280.249	919.450	Near Duncan, Okla.	1104 Boundary	336.525	1104.083
Near Tippecanoe, Pa.	868 Pittsburgh	264.335	867.239	Do.	Duncan A.....	373.193	1224.384
Near West Brownsville Junction, Pa.	778 Pittsburgh	236.945	777.377	Do.	Check B. M.	373.166	1224.295
Do.	P. R. R. No. 54	236.944	777.374	Duncan, Okla.	J.....	343.344	1125.455
Near Woods Run, Pa.	764 Pittsburgh	233.192	765.064	Near Duncan, Okla.	1127 Duncan	343.705	1127.639
Near Charleroi, Pa.	760 Pittsburgh	230.913	757.587	Near Marlow, Okla.	K.....	395.646	1298.049
Lock No. 4, Pa.	Lock No. 4.	226.626	743.522	Marlow, Okla.	L.....	400.462	1313.849
Baird, Pa.	755 Pittsburgh	230.075	754.838	Do.	Marlow Long. Sta.	400.030	1312.432
Near River View, Pa.	753 Pittsburgh	229.511	752.987	Near Marlow, Okla.	1331 Marlow	405.991	1331.989
Near Peters Creek, Pa.	740 Pittsburgh	225.368	739.395	Do.	M.....	386.784	1268.974
Near Coal Valley, Pa.	P. R. R. No. 19	224.412	736.258	Rush Springs, Okla.	N.....	393.835	1292.107
Near Thomson, Pa.	767 Pittsburgh	233.741	766.865	Do.	1349 Rush Springs	411.451	1349.902
Do.	P. R. R. No. 11	232.820	763.844	Near Rush Springs, Okla.	1292 Rush Springs	393.955	1292.501
Near Bessemer, Pa.	760 Pittsburgh	231.491	759.453	Near Ninnekah, Okla.	T. B. M. 95	383.518	1258.258
Braddock, Pa.	P. R. R. No. 88	252.600	828.738	Do.	O.....	373.390	1225.030
Homewood, Pa.	P. R. R. No. 92	281.443	923.368	Do.	P.....	328.094	1076.422
Near Benvenue, Pa.	818 Pittsburgh	249.353	818.184	Near Chickasha, Okla.	1084 Chickasha	330.658	1084.833
Solomon, Kans.	C.....	358.367	1175.743	Chickasha, Okla.	1091 Chickasha	332.745	1091.681
Near Cambria, Kans.	D.....	365.718	1199.860	Do.	Q.....	333.064	1092.728
Near New Cambria, Kans.	E.....	365.374	1198.731	Near Chickasha, Okla.	R.....	332.243	1090.034
Do.	Salina East Base	365.766	1200.017	Do.	S.....	336.967	1105.532
Near Salina, Kans.	Salina West Base	371.859	1220.008	Do.	T. B. M. 114	335.701	1101.379
Salina, Kans.	F.....	373.230	1224.506	Near Minco, Okla.	Carson A.	435.699	1429.455
Do.	G.....	373.633	1225.828	Do.	1284 Minco	391.626	1284.860
Do.	H.....	373.677	1225.972	Minco, Okla.	T.....	395.329	1297.009
Mentor, Kans.	A.....	385.707	1265.440	Do.	U.....	396.502	1300.857
Assaria, Kans.	B.....	390.788	1282.110	Near Union, Okla.	1266.5 Union	386.419	1267.776
Bridgeport, Kans.	C.....	396.694	1301.487	Union, Okla.	A.....	406.872	1334.879
Lindsborg, Kans.	D.....	407.252	1336.126	Near El Reno, Okla.	El Reno East Base	440.047	1443.721
Johnstown, Kans.	E.....	424.336	1392.176	Do.	El Reno West Base	466.784	1531.441
Hilton, Kans.	F.....	462.837	1518.491	El Reno, Okla.	T. B. M. 142	416.176	1365.404
McPherson, Kans.	G.....	455.922	1495.804	Do.	B.....	414.586	1360.188
Do.	H.....	456.260	1496.913	Do.	1357 El Reno	414.207	1358.944
Near McPherson, Kans.	I.....	453.922	1489.242	Do.	City El Reno	413.794	1357.589
Groveland, Kans.	J.....	451.762	1482.155	Reno Junction, Okla.	1327 Reno Junction	405.061	1328.938
Inman, Kans.	K.....	462.868	1518.593	Darlington, Okla.	C.....	407.346	1336.434
Medora, Kans.	L.....	450.207	1477.054	Near Caddo, Okla.	T. B. M. 148	416.406	1366.158
Near Hutchinson, Kans.	M.....	467.712	1534.485	Okarche, Okla.	D.....	377.736	1239.289
Hutchinson, Kans.	N.....	467.085	1532.428	Kingfisher, Okla.	E.....	320.963	1053.026
Do.	O.....	466.143	1529.338	Do.	F.....	322.287	1057.370
Fernie, Kans.	P.....	471.833	1548.005	Do.	G.....	321.988	1056.389
Darlow, Kans.	Q.....	474.497	1556.745	Dover, Okla.	H.....	315.136	1033.909
Castleton, Kans.	R.....	446.851	1466.044	Hennessey, Okla.	I.....	354.238	1162.196
Pretty Prairie, Kans.	S.....	480.015	1574.849	Bison, Okla.	J.....	354.361	1162.600
Near Pretty Prairie, Kans.	T.....	481.112	1578.448	Waukomis, Okla.	K.....	378.003	1240.164
Varner, Kans.	U.....	463.273	1519.922	Near Waukomis, Okla.	L.....	385.323	1264.180
Lashmet, Kans.	V.....	460.876	1512.057	Do.	Waukomis A.	388.723	1275.335
Kingman, Kans.	W.....	505.041	1656.955	Enid, Okla.	M.....	384.606	1261.826
Near Kingman, Kans.	X.....	496.374	1628.520	Do.	N.....	377.171	1237.436
Carvel, Kans.	Y.....	487.358	1598.940	Do.	O.....	380.141	1247.179
Basil, Kans.	Z.....	440.972	1446.756	North Enid, Okla.	P.....	380.978	1249.926
Rago, Kans.	A.....	482.808	1584.013	Near North Enid, Okla.	Enid A.	385.073	1263.360
Duquoin, Kans.	B.....	433.328	1421.677	Kremlin, Okla.	Q.....	341.666	1120.949
Harper, Kans.	C.....	432.739	1419.744	Pond Creek, Okla.	R.....	320.157	1050.382
Ascot, Kans.	D.....	422.191	1385.139	Near Jefferson, Okla.	S.....	319.400	1047.898
Anthony, Kans.	E.....	419.544	1376.453	Medford, Okla.	T.....	331.399	1087.265
Near Anthony, Kans.	Anthony SE. Base	425.248	1395.168	Do.	U.....	335.071	1099.312
Do.	Anthony NW. Base	409.712	1344.197	Clyde, Okla.	V.....	335.026	1099.164
Anthony, Kans.	F.....	409.712	1344.197	Wakita, Okla.	W.....	339.319	1113.249
Bowie, Tex.	1124 GAINV.	342.556	1123.869	Gibbon, Okla.	X.....	360.263	1181.963
Do.	A.....	329.258	1080.241	Manchester, Okla.	Y.....	360.596	1183.056
Do.	B.....	349.050	1145.175	Spring, Kans.	G.....	392.742	1288.521
Near Bowie, Tex.	C.....	289.773	950.697	Forth Worth, Tex.	V.....	188.749	619.254
Near Bellevue, Tex.	Bowie NW. Base	327.377	1074.069	Handley, Tex.	W.....	176.294	578.391
Do.	Bowie SE. Base	333.315	1093.551	Arlington, Tex.	X.....	188.347	617.935
Near Bowie, Tex.	989 GAINV.	301.557	989.358	Grand Prairie, Tex.	Y.....	159.939	524.733
Do.	D.....	292.569	959.870	Eagle Ford, Tex.	Z.....	134.392	440.918
Stoneburg, Tex.	E.....	285.030	935.136	Dallas, Tex.	A.....	132.274	433.969
Do.	936 GAINV.	285.363	936.228	Do.	B.....	136.402	447.512
Near Stoneburg, Tex.	876 GAINV.	267.014	876.028	Do.	C.....	132.761	435.567
Near Ringgold, Tex.	F.....	268.794	881.868	Fisher, Tex.	D.....	161.096	528.529
Do.	897 GAINV.	273.242	896.461	Garland, Tex.	E.....	167.923	550.927
Ringgold, Tex.	894 GAINV.	272.604	894.308	Rowlett, Tex.	F.....	153.872	504.828
Near Terral, Okla.	G.....	248.582	815.556	Rockwall, Tex.	G.....	181.536	595.589
Do.	809 Terral	246.635	809.168	Fate, Tex.	H.....	180.064	590.760
Terral, Okla.	A.....	258.112	846.822	Royse, Tex.	I.....	170.848	559.324
				Caddo Mills, Tex.	J.....	161.684	530.458
				Greenville, Tex.	K.....	164.876	540.931

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Greenville, Tex.	L ₁	168.928	554.225	Columbus, Nebr.	D ₁	†440.805	1446.207
Do.	M ₁	167.143	548.368	Do.	E ₁	441.242	1447.642
Near Greenville, Tex.	N ₁	173.272	568.477	Near Columbus, Nebr.	F ₁	445.953	1463.098
Campbell, Tex.	O ₁	178.531	585.730	Oconee, Nebr.	G ₁	†454.949	1492.612
Cumby, Tex.	P ₁	197.849	649.110	Platte Center, Nebr.	H ₁	488.527	1537.159
Brashear, Tex.	Q ₁	156.974	515.006	Tarnov, Nebr.	I ₁	495.047	1624.167
Sulphur Springs, Tex.	R ₁	153.502	503.614	Humphrey, Nebr.	J ₁	515.928	1692.668
Como, Tex.	S ₁	162.234	532.293	Near Madison, Nebr.	K ₁	494.637	1622.822
Pickton, Tex.	T ₁	163.639	536.872	Madison, Nebr.	L ₁	484.567	1589.784
Winnabow, Tex.	U ₁	162.575	533.382	Near Madison, Nebr.	M ₁	517.150	1696.683
Scroggins, Tex.	V ₁	108.462	355.846	Near Norfolk, Nebr.	N ₁	463.756	1522.506
Near Leesburg, Tex.	W ₁	119.135	392.897	Norfolk, Nebr.	O ₁	464.912	1525.298
Near Pittsburg, Tex.	X ₁	117.822	386.554	Do.	P ₁	464.148	1522.792
Pittsburg, Tex.	Y ₁	121.279	397.897	Near Norfolk, Nebr.	Norfolk 3.	461.820	1515.154
Cason, Tex.	Z ₁	99.377	326.039				
Daingerfield, Tex.	A ₁	123.765	402.775	Hope, Nebr.	Q ₁	473.437	1553.268
Hughes, Tex.	B ₁	115.273	378.192	Hoskins, Nebr.	R ₁	507.928	1666.427
Avinger, Tex.	C ₁	121.456	398.196	Apex, Nebr.	S ₁	548.892	1784.419
Near Avinger, Tex.	D ₁	121.790	399.572	Winside, Nebr.	T ₁	470.528	1545.409
Lasater, Tex.	E ₁	101.994	334.525	Wayne, Nebr.	U ₁	444.603	1458.298
Kellyville, Tex.	F ₁	89.433	293.411	Wakefield, Nebr.	V ₁	439.746	1413.206
Jefferson, Tex.	G ₁	57.743	189.445	Ridge, Nebr.	W ₁	462.709	1518.042
Norwood, Tex.	H ₁	63.097	207.010	Emerson, Nebr.	X ₁	434.377	1425.118
Karnack, Tex.	J ₁	70.484	231.247	Nacora, Nebr.	Y ₁	428.924	1407.228
Blocker, Tex.	K ₁	80.730	264.862	Hubbard, Nebr.	Z ₁	352.369	1156.064
Waskom, Tex.	L ₁	91.211	299.248	Coburn, Nebr.	A ₁	339.189	1112.980
Greenwood, La.	C ₁	86.948	285.216	Dakota City, Nebr.	M. R. C. Dakota City	334.496	1097.426
Nichols, La.	D ₁	83.931	275.364	South Sioux City, Nebr.	B ₁	335.865	1101.917
Jewells, La.	E ₁	74.466	244.311				
Shreveport, La.	F ₁	57.616	188.028	Sioux City, Iowa	P. B. M. 395 Gauge		
Do.	G ₁	62.259	204.294	Do.	Top of cap.	333.475	1094.070
Do.	H ₁	55.421	181.827	Do.	P. B. M. 395-14	337.176	1106.218
Do.	I ₁	55.991	183.697	Do.	Top of cap.	338.401	1110.237
				Do.	P. B. M. 397	335.371	1100.296
				Do.	Top of cap.	336.695	1104.312
Solomon, Kans.	W ₁	355.930	1167.747	Near Sioux City, Iowa			
Do.	X ₁	357.327	1172.330				
Abilene, Kans.	B ₁	352.740	1157.281	Hadar, Nebr.	C ₁	474.371	1556.333
Do.	Z ₁	352.780	1157.412	Pierce, Nebr.	D ₁	483.008	1585.231
Do.	Y ₁	350.467	1149.824	Foster, Nebr.	E ₁	469.392	1539.422
Talmage, Kans.	A ₁	369.191	1211.254	Plainview, Nebr.	F ₁	517.313	1697.217
Manchester, Kans.	B ₁	394.628	1294.708	Do.	G ₁	517.330	1697.273
Longford, Kans.	C ₁	400.725	1314.712	Brunswick, Nebr.	H ₁	565.071	1853.903
Oak Hill, Kans.	D ₁	386.823	1269.102	Savage, Nebr.	I ₁	529.245	1737.702
Catlin, Kans.	E ₁	404.735	1327.868	Orchard, Nebr.	J ₁	591.636	1941.059
Miltonvale, Kans.	F ₁	419.486	1376.264	Page, Nebr.	K ₁	596.101	1955.708
Sulphur Springs, Kans.	G ₁	479.582	1573.428	Near Page, Nebr.	L ₁	611.107	2004.941
Aurora, Kans.	H ₁	451.579	1481.555	Do.	M ₁	623.329	2045.257
Huscher, Kans.	I ₁	446.728	1465.640	Do.	Page SW. Base	623.053	2043.976
Concordia, Kans.	J ₁	422.358	1385.686	Near O'Neill, Nebr.	N ₁	603.490	1983.670
Do.	City	419.286	1375.607	O'Neill, Nebr.	O ₁	603.008	1980.809
Do.	K ₁	416.873	1367.690	Emmett, Nebr.	P ₁	609.574	1999.910
Hannum, Kans.	L ₁	415.447	1363.012	Near Atkinson, Nebr.	Q ₁	616.196	2021.635
Onsenta, Kans.	M ₁	425.777	1396.903	Atkinson, Nebr.	R ₁	629.582	2065.554
Kackley, Kans.	N ₁	461.341	1513.583	Near Stuart, Nebr.	S ₁	642.912	2109.287
Courtland, Kans.	O ₁	457.387	1500.611	Stuart, Nebr.	T ₁	652.125	2139.513
Lovewell, Kans.	P ₁	470.953	1545.119	Newport, Nebr.	U ₁	656.988	2155.468
Webber, Kans.	Q ₁	508.308	1667.673	Near Bassett, Nebr.	V ₁	679.914	2230.684
Near Superior, Nebr.	R ₁	472.510	1550.227	Bassett, Nebr.	W ₁	683.305	2241.023
Superior, Nebr.	B	479.614	1573.534	Long Pine, Nebr.	X ₁	709.040	2326.242
Near Superior, Nebr.	Superior 2.	476.432	1563.095	Ainsworth, Nebr.	Y ₁	732.269	2402.453
Bostwick, Nebr.	C	488.780	1603.606	Near Johnstown, Nebr.	Z ₁	768.990	2522.846
Guide Rock, Nebr.	D	507.298	1664.360	Near Woodlake, Nebr.	A ₁	789.126	2588.991
Amboy, Nebr.	E	515.319	1690.676	Do.	B ₁	809.734	2656.602
Cowles, Nebr.	F	546.352	1792.491	Do.	C ₁	823.465	2701.651
Near Blue Hill, Nebr.	G	601.932	1974.264	Near Arabia, Nebr.	D ₁	831.154	2726.877
Do.	Blue Hill A.	621.968	2040.574	Thatcher, Nebr.	E ₁	808.847	2653.092
Blue Hill, Nebr.	H	600.833	1971.233	Valentine, Nebr.	F ₁	787.914	2585.014
Ayr, Nebr.	I	560.076	1837.516	Near Crookston, Nebr.	G ₁	795.791	2610.858
Brickton, Nebr.	J	557.550	1829.228	Do.	H ₁	829.740	2722.239
Hastings, Nebr.	K	588.426	1930.528	Georgia, Nebr.	I ₁	888.466	2914.948
Do.	Bank	588.534	1930.882	Nenzil, Nebr.	J ₁	947.931	3110.003
Do.	Tower	588.876	1932.004	Cody, Nebr.	K ₁	944.324	3098.438
Hansen, Nebr.	L	591.904	1941.938	Near Cody, Nebr.	L ₁	955.973	3136.388
Doniphan, Nebr.	M	592.675	1944.468	Near Eli, Nebr.	M ₁	981.003	3218.508
Rivers, Nebr.	N	570.940	1873.159	Do.	N ₁	973.157	3192.766
Near Grand Island, Nebr.	O	572.065	1876.850	Near Merriman, Nebr.	O ₁	988.349	3242.608
Grand Island, Nebr.	P	568.095	1863.825	Do.	P ₁	1015.392	3331.332
Do.	Q	565.625	1855.721	Irwin, Nebr.	Q ₁	1047.970	3438.215
Near Grand Island, Nebr.	R	579.427	1901.003	Near Gordon, Nebr.	R ₁	1080.363	3544.491
Near Aida, Nebr.	S	590.752	1938.158	Gordon, Nebr.	S ₁	1093.100	3553.776
Wood River, Nebr.	T	599.017	1965.275	Do.	T ₁	1083.960	3556.292
Shelton, Nebr.	Shelton East Base.	615.554	2019.530	Near Clinton, Nebr.	U ₁	1129.182	3704.658
Lockwood, Nebr.	U	549.702	1803.480	Rushville, Nebr.	V ₁	1139.712	3739.205
Chapman, Nebr.	V	539.556	1770.193	Near Rushville, Nebr.	W ₁	1144.959	3756.420
Paddock, Nebr.	W	524.000	1721.309	Hay Springs, Nebr.	X ₁	1166.786	3828.031
Central City, Nebr.	X	518.579	1701.372	Near Bordeaux, Nebr.	Y ₁	1137.318	3731.351
Thummel, Nebr.	Y	505.388	1658.087	Near Chadron, Nebr.	Z ₁	1033.043	3390.242
Clarks, Nebr.	Z	495.416	1625.378	Chadron, Nebr.	A ₁	1026.878	3369.015
Havens, Nebr.	A ₁	482.808	1584.013	Do.	B ₁	1033.806	3391.745
Silver Creek, Nebr.	B ₁	471.571	1547.145	Near Chadron, Nebr.	C ₁	1017.080	3336.870
Duncan, Nebr.	C ₁	454.792	1492.097	Do.	D ₁	1005.526	3288.944
Near Columbus, Nebr.	Columbus 2.	443.044	1453.553	Whitney, Nebr.	E ₁	1039.130	3409.212
Do.	Columbus 3.	439.678	1442.511				

* Reported destroyed, 1900.

† Reported destroyed, 1910.

‡ Reported disturbed, 1911.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Crawford, Nebr.	F ₁	1095.710	3594.843	Near Como, Wyo.	H ₂	2063.255	6769.196
Crawford, Nebr.	G ₄	1121.040	3677.945	Hanna, Wyo.	I ₂	2066.353	6779.360
Fort Robinson, Nebr.	H ₁	1153.302	3783.792	Near Hanna, Wyo.	J ₂	2065.378	6776.161
Near Glen, Nebr.	I ₄	1221.023	4005.973	Dana, Wyo.	K ₂	2070.262	6792.185
Near Andrews, Nebr.	J ₄	1346.023	4416.077	Edson, Wyo.	L ₂	2061.622	6753.838
Near Harrison, Nebr.	K ₄	1482.348	4863.337	Near Walcott, Wyo.	M ₂	2013.224	6605.052
Harrison, Nebr.	L ₄	1486.757	4870.102	Fort Steele, Wyo.	N ₂	1985.638	6514.547
Near Harrison, Nebr.	M ₄	1463.089	4800.151	Near Greenville, Wyo.	Geol. Surv. West	2006.650	6583.494
Near Van Tassel, Wyo.	U ₁	1452.236	4764.544	Do.	Base.		
Node Ranch, Wyo.	V ₁	1504.600	4936.341	Do.	O ₂	2007.028	6584.724
Lusk, Wyo.	W ₁	1528.490	5014.721	Rawlins, Wyo.	P ₂	2056.948	6748.504
Manville, Wyo.	X ₁	1598.734	5245.180	Do.	Q ₂	2058.786	6754.534
Keeline, Wyo.	Y ₁	1611.802	5288.053	Do.	R ₂	2068.804	6787.401
Lost Spring, Wyo.	Z ₁	1522.327	4994.501	Solon, Wyo.	S ₂	2110.597	6924.517
Shawnee, Wyo.	A ₂	1531.335	5024.055	Near Daleys Ranch, Wyo.	T ₂	2035.616	6678.517
Fisher, Wyo.	B ₂	1451.007	4760.512	Riner, Wyo.	U ₂	2059.601	6757.207
				Fillmore, Wyo.	V ₂	2126.816	6977.729
Near Silver Crown, Wyo.	X	1915.568	6284.659	Creston, Wyo.	W ₂	2167.142	7110.032
Silver Crown, Wyo.	Y	1951.404	6402.231	Near Latham, Wyo.	X ₂	2111.867	6928.684
Near Volente, Wyo.	Z	2057.351	6749.825	Wamsutter, Wyo.	Y ₂	2044.932	6709.081
Islay, Wyo.	A ₁	2043.763	6705.246	Near Red Desert, Wyo.	A ₃	2049.342	6723.550
Near Horse Creek, Wyo.	B ₁	1985.299	6513.435	Red Desert, Wyo.	B ₃	2048.110	6719.508
Near Iron Mountain, Wyo.	C ₁	1983.870	6508.746				
Do.	D ₁	1871.948	6141.550	Near Red Desert, Wyo.	Z ₂	2051.347	6730.128
Near Diamond, Wyo.	E ₁	1763.810	5786.766	Tipton, Wyo.	C ₃	2132.975	6997.935
Do.	F ₁	1668.124	5472.536	Near Table Rock, Wyo.	D ₃	2088.236	6851.154
Near Chugwater, Wyo.	G ₁	1585.650	5202.254	Near Monell, Wyo.	U. P. 779	2057.563	6750.522
Near Bordeaux, Wyo.	H ₁	1507.983	4947.441	Monell, Wyo.	E ₃	2056.983	6748.618
Near Wheatland, Wyo.	I ₁	1439.799	4723.740	Bitter Creek, Wyo.	F ₃	2040.946	6696.004
Wheatland, Wyo.	4737 CHYN	1442.674	4733.173	Near Black Buttes, Wyo.	G ₃	2020.892	6630.210
Do.	J ₁	1444.514	4739.209	Black Buttes, Wyo.	U. P. 793	2017.137	6617.390
Uva, Wyo.	K ₁	1361.934	4468.278	Hallville, Wyo.	H ₃	1998.675	6557.819
Near Buckhorn, Wyo.	L ₁	1445.539	4742.572	Do.	U. P. 799	1998.912	6558.097
Hartville Junction, Wyo.	M ₁	1393.371	4571.418	Near Point of Rocks, Wyo.	U. P. 804	1985.499	6514.092
Wendover, Wyo.	N ₁	1354.790	4444.840	Do.	I ₃	1984.366	6510.374
Cassa, Wyo.	O ₁	1367.706	4487.215	Do.	U. P. 810	1968.912	6459.672
Near Glendo, Wyo.	P ₁	1431.850	4697.661	Near Salt Wells, Wyo.	J ₃	1948.857	6393.875
Near Bona, Wyo.	Q ₁	1432.982	4701.375	Near Baxter, Wyo.	U. P. 823	1920.912	6302.192
Near Orin Junction, Wyo.	R ₁	1424.448	4673.377	Baxter, Wyo.	K ₃	1922.347	6306.900
Orin Junction, Wyo.	S ₁	1434.067	4704.935	Rock Springs, Wyo.	L ₃	1909.795	6265.719
Near Orin Junction, Wyo.	T ₁	1429.803	4690.945	Do.	M ₃	1908.945	6262.930
				Do.	N ₃	1913.275	6277.136
Near Denver, Colo.	N ₂	1564.767	5133.740	Do.	O ₃	1917.016	6289.410
Near Hazeltine, Colo.	O ₂	1552.383	5093.710	Ah Say, Wyo.	U. P. 835	1895.812	6219.843
Near Henderson, Colo.	P ₂	1534.995	5036.062	Near Wilkins, Wyo.	P ₃	1890.518	6202.475
Near Brighton, Colo.	Q ₂	1526.433	5007.972	Wilkins, Wyo.	U. P. 839	1884.782	6183.656
Brighton, Colo.	R ₂	1514.212	4967.878	Green River, Wyo.	Q ₃	1855.507	6087.609
Near Lupton, Colo.	S ₂	1505.058	4937.845	Do.	R ₃	1865.232	6119.516
Lupton, Colo.	T ₂	1495.297	4905.821	Do.	S ₃	1858.853	6098.587
Near Lupton, Colo.	U ₂	1484.614	4870.771	Do.	T ₃	1855.697	6088.233
Near Platteville, Colo.	V ₂	1474.824	4838.652	Near Peru, Wyo.	U ₃	1941.620	6370.181
Do.	W ₂	1469.342	4830.696	Near Bryan, Wyo.	V ₃	1884.623	6183.134
Do.	X ₂	1462.018	4796.637	Near Marston, Wyo.	W ₃	1883.690	6180.073
Near Nantes, Colo.	Y ₂	1449.298	4725.673	Do.	X ₃	1902.348	6241.287
Near La Salle, Colo.	Z ₂	1417.821	4651.635	Near Azusa, Wyo.	Y ₃	1897.545	6225.529
Greeley, Colo.	A ₃	1418.106	4652.569	Do.	T. B. M. 105	1902.022	6240.217
Lucerne, Colo.	B ₃	1446.847	4746.864				
Eaton, Colo.	C ₃	1473.051	4832.835	Ogden, Utah	B	1310.364	4299.086
Pierce, Colo.	D ₃	1534.592	5034.741	Do.	A	1309.370	4295.825
Dover, Colo.	E ₃	1648.189	5407.434	Do.	Transit	1332.056	4370.253
Carr, Colo.	F ₃	1738.374	5703.315	Do.	C	1311.014	4301.218
Athol, Wyo.	A ₄	1920.696	6301.484	Uinta, Utah	D	1370.813	4497.409
Cheyenne, Wyo.	B	1847.183	6060.300	Near Devils Gate, Utah	E	1488.956	4819.400
Do.	C	1846.994	6059.680	Near Strawberry, Utah	F	1473.728	4835.056
Do.	D	1846.956	6059.555	Near Morgan, Utah	G	1535.371	5037.296
Do.	E	1858.568	6097.652	Morgan, Utah	H	1543.212	5063.021
Borlie, Wyo.	F	2013.899	6607.267	Near Croydon, Utah	I	1596.655	5238.359
Otto, Wyo.	G	2119.560	6953.923	Echo, Utah	J	1664.942	5462.397
Granite Canyon, Wyo.	H	2229.055	7313.158	Do.	Geol. Echo	1666.389	5467.145
Sherman, Wyo.	I	2514.704	8250.325	Near Emory, Utah	K	1749.429	5739.586
Do.	J	2524.309	8281.837	Emory, Utah	L	1803.105	5915.687
Dale Creek, Wyo.	K	2440.418	8006.605	Castle Rock, Utah	M	1899.679	6232.530
Do.	L	2439.507	8003.616	Wasatch, Utah	N	2077.532	6816.037
Red Buttes, Wyo.	M	2226.376	7304.369	Wyuta, Utah	O	2052.256	6733.110
Laramie, Wyo.	N	2184.368	7166.547	Evanston, Wyo.	6770 Evanston	2055.956	6745.249
Do.	O	2174.162	7133.063	Do.	A ₆	2057.298	6749.652
Howell, Wyo.	P	2165.317	7104.044	Do.	6779 Evanston	2058.613	6753.966
Wyoming, Wyo.	Q	2157.870	7079.612	Knight, Wyo.	B ₆	2152.606	7062.341
Coopers Lake, Wyo.	R	2147.266	7044.822	Altamont, Wyo.	C ₆	2200.596	7219.789
Lookout, Wyo.	S	2186.434	7173.326	Springvalley, Wyo.	D ₆	2137.390	7012.420
Harper, Wyo.	T	2136.708	7010.183	Leroy, Wyo.	E ₆	2040.596	6694.856
Near Rock Creek, Wyo.	U	2043.797	6705.357	Bridger, Wyo.	F ₆	2020.784	6629.855
Rock Creek, Wyo.	V	2043.604	6704.724	Near Bridger, Wyo.	G ₆	2006.245	6582.155
				Carter, Wyo.	H ₆	1981.166	6499.876
				Do.	I ₆	1981.963	6502.490
Rock Creek, Wyo.	W	*2043.954	6704.921	Elkhurst, Wyo.	J ₆	1959.408	6428.491
Near Wilcox, Wyo.	C ₁	2110.385	6923.821	Near Hampton, Wyo.	K ₆	1951.706	6403.222
Near Aurora, Wyo.	D ₁	2056.154	6745.899	Church Buttes, Wyo.	L ₆	1935.446	6350.532
Medicine Bow, Wyo.	E ₁	2001.247	6565.758	Do.	M ₆	1936.624	6353.741
Do.	F ₁	1999.644	6580.498	Garrett, Wyo.	N ₆	1933.335	6342.950
Allen, Wyo.	G ₁	2015.824	6613.583	Near Granger, Wyo.	O ₆	1911.636	6271.759
				Granger, Wyo.	P ₆	1910.436	6267.822

* Elevation from line of 1902 only. The bench mark had apparently settled about 5 mm. since determination in 1899.

† This bench mark was reported in 1905 as having sunk about 0.052 meter.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Hot Springs, Utah.....	P.....	1301.873	4271.228	Nampa, Idaho.....	I.....	757.150	2484.083
Willard, Utah.....	Q.....	1300.253	4265.913	Do.....	O. S. L.....	757.197	2484.237
Brigham, Utah.....	R.....	1309.150	4285.103	Near Nampa, Idaho.....	J.....	743.617	2439.683
Honeyville, Utah.....	S.....	1298.631	4260.592	Do.....	K.....	738.189	2421.875
Dewey, Utah.....	T.....	1317.551	4322.065	Near Caldwell, Idaho.....	L.....	725.578	2380.500
Bear River, Utah.....	U.....	1370.488	4496.343	Caldwell, Idaho.....	M.....	723.928	2375.087
Cache Junction, Utah.....	V.....	1356.012	4448.849	Do.....	N.....	723.296	2372.990
Do.....	W.....	1353.767	4441.484	Do.....	O.....	722.043	2368.970
Ransom, Utah.....	X.....	1359.322	4459.709	Do.....	P.....	723.241	2372.833
Near Cornish, Utah.....	Y.....	1379.029	4524.364	Near Caldwell, Idaho.....	Q.....	717.398	2353.663
Weston, Idaho.....	A.....	1403.477	4604.574	Do.....	R.....	711.502	2334.319
Dayton, Idaho.....	B.....	1446.207	4744.764	Near Notus, Idaho.....	S.....	703.703	2308.732
Garner, Idaho.....	C.....	1448.063	4750.853	Do.....	T.....	698.203	2290.688
Do.....	D.....	1446.597	4746.044	Near Parma, Idaho.....	U.....	682.555	2239.349
Near Oxford, Idaho.....	E.....	1447.186	4747.976	Do.....	O. S. L.....	677.840	2223.880
Near Swan Lake, Idaho.....	F.....	1455.978	4776.821	Do.....	V.....	672.667	2206.908
Downey, Idaho.....	G.....	1480.592	4857.576	In Idaho, near Nyssa, Oreg.....	W.....	671.185	2202.046
Marsh Valley, Idaho.....	H.....	1446.022	4744.157	Do.....	X.....	667.461	2189.829
McCammon, Idaho.....	I.....	1449.186	4754.538	Near Nyssa, Oreg.....	F.....	665.942	2184.845
Near Onyx, Idaho.....	J.....	1408.231	4620.171	Do.....	G.....	664.799	2181.095
Inkom, Idaho.....	K.....	1379.126	4524.683	Do.....	H.....	660.712	2167.686
Do.....	L.....	1377.702	4520.011	Near Ontario, Oreg.....	J.....	657.891	2158.431
Portneuf, Idaho.....	M.....	1367.604	4486.881	Do.....	I.....	658.526	2160.514
Pocatello, Idaho.....	A.....	1358.740	4457.799	Ontario, Oreg.....	2143 H.....	655.807	2151.594
Do.....	B.....	1360.328	4463.009	Do.....	K.....	657.090	2155.802
Pocatello, Idaho.....	C.....	1363.616	4473.797	Do.....	L.....	655.882	2155.121
Do.....	City.....	1360.304	4462.931	Do.....	M.....	657.066	2155.724
Do.....	D.....	1360.774	4464.473	Do.....	N.....	654.888	2148.578
Do.....	E.....	1362.027	4468.584	Near Payette, Idaho.....	Y.....	654.787	2148.247
Near Pocatello, Idaho.....	F.....	1344.024	4409.519	Do.....	2139 H (1).....	654.602	2147.640
Near Michaud, Idaho.....	G.....	1350.085	4429.404	Do.....	Z.....	653.627	2144.442
Bannock, Idaho.....	H.....	1344.720	4411.802	Payette, Idaho.....	A.....	655.075	2149.192
Near American Falls, Idaho.....	I.....	1336.574	4385.076	Do.....	B.....	656.038	2152.351
American Falls, Idaho.....	O. S. L.....	1321.820	4336.671	Do.....	C.....	655.596	2150.901
Near American Falls, Idaho.....	O. S. L.....	1320.20	4331.36	Near Payette, Idaho.....	2139 H (2).....	654.360	2146.846
American Falls, Idaho.....	J.....	1319.540	4329.191	Near Crystal, Idaho.....	2123 H.....	648.611	2131.265
Near Napat, Idaho.....	K.....	1364.580	4476.960	Do.....	D.....	648.253	2126.810
Near Wapi, Idaho.....	L.....	1347.742	4421.717	Near Weiser, Idaho.....	2112 H.....	646.259	2120.268
Wapi, Idaho.....	O. S. L.....	1341.421	4400.978	Do.....	E.....	644.207	2113.535
Near Wapi, Idaho.....	M.....	1316.324	4318.640	Do.....	2113 H.....	643.478	2120.987
Near Yale, Idaho.....	N.....	1298.147	4259.004	Do.....	F.....	642.490	2107.902
Minidoka, Idaho.....	O. S. L.....	1305.453	4282.973	Weiser, Idaho.....	2107 H.....	644.671	2115.058
Do.....	O.....	1303.845	4277.698	Do.....	G.....	645.788	2122.004
Near Colburne, Idaho.....	Q.....	1298.370	4259.736	Do.....	H.....	645.875	2119.009
Do.....	Q.....	1322.292	4338.219	Near Eaton, Idaho.....	2122 H.....	649.308	2130.272
Kimama, Idaho.....	O. S. L.....	1302.483	4273.229	Do.....	I.....	644.482	2114.438
Do.....	R.....	1299.512	4263.482	Do.....	2097 H.....	641.535	2104.770
Senter, Idaho.....	S.....	1285.192	4216.501	Do.....	J.....	639.696	2098.736
Owinza, Idaho.....	T.....	1281.781	4205.310	Near Olds Ferry, Idaho.....	2087 H.....	638.496	2094.799
Near Owinza, Idaho.....	U.....	1260.534	4135.602	Do.....	2086 H.....	638.211	2093.864
Dietrich, Idaho.....	V.....	1240.894	4071.166	Olds Ferry, Idaho.....	K.....	631.868	2073.054
Shoshone, Idaho.....	W.....	1209.758	3969.014	Near Olds Ferry, Idaho.....	2070 H.....	633.324	2077.831
Do.....	X.....	1208.287	3964.188	Do.....	2069 H.....	633.187	2077.381
Near Tunupa, Idaho.....	Y.....	1209.414	3967.885	Near Huntington, Oreg.....	2079 A.....	635.957	2086.469
Do.....	Z.....	1142.222	3747.440	Do.....	O.....	636.084	2086.886
Gooding, Idaho.....	A.....	1129.858	3706.876	Do.....	P.....	648.278	2126.892
Fuller, Idaho.....	B.....	1088.226	3570.288	Do.....	Q.....	639.131	2096.883
Bliss, Idaho.....	C.....	1036.651	3401.079	Huntington, Oreg.....	2105 A.....	644.146	2113.336
Tieska, Idaho.....	D.....	993.490	3259.475	Do.....	R.....	644.903	2115.819
King Hill, Idaho.....	E.....	938.806	3080.066	Near Huntington, Oreg.....	S.....	649.787	2131.843
Glenns Ferry, Idaho.....	F.....	772.660	2534.968	Do.....	T.....	655.003	2148.956
Do.....	G.....	779.967	2558.942	Do.....	U.....	660.026	2165.436
Near Glenns Ferry, Idaho.....	H.....	785.508	2577.120	Do.....	V.....	665.700	2184.248
Medbury, Idaho.....	I.....	760.045	2493.581	Do.....	2215 A.....	677.544	2222.909
Chalk Spur, Idaho.....	J.....	779.136	2556.215	Do.....	W.....	679.374	2228.913
Near Mountain Home, Idaho.....	K.....	879.666	2886.037	Do.....	X.....	683.585	2242.729
Do.....	L.....	937.460	3075.650	Do.....	Y.....	688.798	2262.797
Mountain Home, Idaho.....	M.....	958.736	3145.453	Near Weatherby, Oreg.....	2369 A.....	724.457	2376.822
Do.....	N.....	956.760	3138.970	Do.....	Z.....	734.554	2409.949
Do.....	O.....	957.985	3142.989	Near Durkee, Oreg.....	A.....	735.394	2412.705
Near Mountain Home, Idaho.....	P.....	969.848	3181.909	Do.....	2518 A.....	770.031	2526.343
Cleft, Idaho.....	Q.....	981.355	3219.663	Do.....	B.....	780.672	2561.254
Near Orchard, Idaho.....	R.....	963.189	3160.063	Durkee, Oreg.....	2647 A.....	809.144	2654.667
Do.....	S.....	958.658	3145.197	Near Durkee, Oreg.....	C.....	834.180	2736.806
Near Owyhee, Idaho.....	T.....	912.233	2992.884	Do.....	D.....	858.848	2817.737
Do.....	U.....	909.295	2983.246	Unity, Oreg.....	3139 A.....	959.069	3146.546
Owyhee, Idaho.....	V.....	903.644	2964.705	Near Unity, Oreg.....	E.....	957.336	3140.860
Do.....	W.....	903.902	2965.552	Near Pleasant Valley, Oreg.....	F.....	1077.000	3533.457
Near Mora, Idaho.....	X.....	862.564	2829.929	Pleasant Valley, Oreg.....	3318 A.....	1168.423	3826.839
Mora, Idaho.....	Y.....	843.208	2766.425	Near Encina, Oreg.....	G.....	1203.350	3954.552
Near Mora, Idaho.....	Z.....	838.156	2749.850	Near Norton, Oreg.....	H.....	1132.685	3716.151
Near Kuna, Idaho.....	A.....	806.007	2644.374	Norton, Oreg.....	3646 A.....	1113.821	3654.261
Do.....	B.....	805.263	2641.950	Near Baker City, Oreg.....	I.....	1063.485	3495.678
Do.....	C.....	798.769	2620.628	Baker City, Oreg.....	3433 A.....	1048.780	3440.872
Near Nampa, Idaho.....	D.....	775.774	2545.185	Do.....	J.....	1049.587	3443.520
Nampa, Idaho.....	E.....	758.232	2487.632	Do.....	K.....	1050.591	3446.814
Do.....	F.....	759.126	2490.566	Near Baker City, Oreg.....	L.....	1051.216	3448.864
Do.....	G.....	758.375	2488.102	Do.....	M.....	1028.044	3372.841
Do.....	H.....	758.210	2487.560	Near Wingville, Oreg.....	3338 A.....	1019.898	3346.115
				Near Haines, Oreg.....	N.....	1014.114	3327.139
				Do.....	O.....	1018.366	3341.089
				Hutchinson, Oreg.....	3372 A.....	1030.123	3379.662
				Near North Powder, Oreg.....	P.....	1003.625	3292.726

* On spur consisting of single line.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
North Powder, Oreg.	3233 A.	988.212	3242.159	Black River, Wash.	H.	6.262	20.545
Do.	Q ₂	992.577	3256.479	Near Black River, Wash.	I.	10.427	34.209
Near North Powder, Oreg.	R ₂	975.300	3199.797	Kent, Wash.	J.	12.300	40.354
Do.	S ₂	972.014	3189.016	Do.	K.	12.928	42.414
Do.	T ₂	971.932	3188.747	Near Thomas, Wash.	L.	16.105	52.838
Do.	3228 A.	986.138	3235.354	Auburn, Wash.	M.	22.614	74.193
Near Telocaset, Oreg.	U ₂	1005.869	3300.088	Do.	N.	25.523	83.737
Do.	V ₂	1048.017	3438.369	Near Auburn, Wash.	O.	30.318	99.468
Do.	3440 A.	1050.530	3446.613	Near Covington, Wash.	P.	100.817	330.764
Do.	W ₂	989.950	3247.861	Covington, Wash.	Q.	105.557	346.315
Near Union Station, Oreg.	3021 A.	922.670	3027.127	Near Ravensdale, Wash.	R.	175.749	576.602
Do.	X ₂	857.384	2812.934	Ravensdale, Wash.	S.	188.553	618.611
Union, Oreg.	Y ₂	851.206	2792.665	Near Ravensdale, Wash.	T.	198.474	651.160
Do.	Z ₂	850.117	2789.092	Do.	U.	214.998	705.372
Do.	G. S. Union.	849.962	2788.583	Near Palmer Junction, Wash.	V.	258.454	847.944
Do.	A ₃	851.266	2792.862	Wash.			
Near Union Station, Oreg.	2705 A.	826.444	2711.425	Palmer Junction, Wash.	W.	261.589	858.230
Do.	B ₃	823.117	2700.510	Near Palmer Junction, Wash.	X.	284.156	932.268
Do.	2696 A.	823.522	2701.838				
Near Lagrande, Oreg.	C ₂	825.359	2707.865	Near Eagle Gorge, Wash.	1046 T.	319.041	1046.721
Do.	D ₂	832.538	2731.419	Do.	Y.	329.253	1080.224
Lagrande, Oreg.	2773 A.	847.144	2779.338	Canton, Wash.	Z.	367.164	1204.604
Do.	E ₃	848.897	2785.090	Do.	1205 T.	367.624	1206.113
Do.	F ₃	849.833	2788.160	Maywood, Wash.	1335 T.	407.223	1336.031
Do.	G ₃	849.318	2786.470	Hot Springs, Wash.	1531 T.	466.997	1532.139
Do.	2782 A.	849.716	2787.777	Do.	A ₁	462.776	1518.291
Near Lagrande, Oreg.	H ₃	868.014	2847.810	Near Hot Springs, Wash.	B ₁	479.596	1573.474
Do.	I ₃	871.401	2858.921	Lester, Wash.	1614 T.	492.293	1615.131
Perry, Oreg.	2897 A.	884.839	2903.009	Near Weston, Wash.	C ₁	601.904	1974.747
Near Hilgard, Oreg.	J ₃	904.393	2967.163	Near Borup, Wash.	D ₁	656.982	2155.448
Hilgard, Oreg.	3001 A.	916.714	3007.586	Stampede, Wash.	2776 T.	846.538	2777.350
Near Hilgard, Oreg.	3581 A.	1093.755	3588.428	Near Stampede, Wash.	E ₁	856.572	2810.270
Near Kamela, Oreg.	K ₃	1023.698	3358.583	Do.	F ₁	868.526	2849.489
Kamela, Oreg.	4199 A.	1282.044	4206.173	Martin, Wash.	2782 T.	848.580	2784.050
Near Meacham, Oreg.	3958 A.	1208.652	3965.385	Near Easton, Wash.	G ₁	682.403	2238.850
Do.	L ₃	1145.262	3757.414	Easton, Wash.	H ₁	660.437	2166.784
Meacham, Oreg.	3672 A.	1121.507	3679.478	Do.	I ₁	661.152	2169.130
Near Meacham, Oreg.	3454 A.	1054.839	3460.751	Do.	† 661.498	2170.265	
Do.	M ₃	1021.561	3351.572	Near Nelson, Wash.	J ₁	632.210	2074.176
Do.	N ₃	971.995	3188.953	Nelson, Wash.	2030 T.	619.219	2031.554
Do.	O ₃	933.294	3061.982	Cle Elum, Wash.	K ₁	582.338	1910.554
Do.	P ₃	882.060	2893.892	Do.	L ₁	583.366	1913.993
Do.	Q ₃	846.388	2776.858	Do.	M ₁	582.041	1909.579
Near North Fork, Oreg.	2570 A.	785.134	2575.894	Teanaway, Wash.	1838 T.	560.365	1838.464
Do.	R ₃	780.873	2561.914	Bristol, Wash.	1784 T.	544.114	1785.147
Do.	S ₃	755.930	2480.080	Near Bristol, Wash.	N ₁	533.846	1751.460
Do.	T ₃	745.514	2445.908	Near Thorp, Wash.	O ₁	521.732	1711.715
Do.	2264 A.	691.742	2269.490	Do.	1658 T.	505.698	1659.111
Do.	U ₃	684.919	2247.105	Thorp, Wash.	1634 T.	498.152	1634.354
Do.	V ₃	657.911	2158.496	Do.	P ₁	497.891	1633.497
Near Bingham Springs, Oreg.	2023 A.	618.120	2027.949	Near Thorp, Wash.	U. S. Base	483.086	1584.925
Do.	W ₃	580.135	1903.327	Ellensburg, Wash.	Q ₁	462.113	1516.116
Do.	X ₃	554.640	1819.681	Do.	1571 T.	479.026	1571.604
Bingham Springs, Oreg.	1744 A.	533.213	1749.383	Do.	R ₁	468.430	1536.841
Near Bingham Springs, Oreg.	Y ₃	503.680	1663.474	Do.	S ₁	461.765	1514.974
Near Cayuse, Oreg.	1523 A.	465.783	1528.157	Thral, Wash.	T ₁	435.354	1428.324
Do.	Z ₃	463.734	1521.434	Umtanum, Wash.	1350 T.	411.540	1350.194
Do.	A ₄	437.053	1433.898	Near Umtanum, Wash.	U ₁	407.717	1337.652
Do.	B ₄	428.043	1404.338	Canyon, Wash.	V ₁	395.155	1296.438
Near Mission, Oreg.	1355 A.	414.139	1358.721	Rosa, Wash.	1249 T.	380.830	1249.440
Do.	C ₄ *	405.307	1329.745	Do.	W ₁	379.564	1245.286
Mission, Oreg.	1205 A.	368.549	1209.148	Selah, Wash.	1147 T.	349.833	1147.743
Pendleton, Oreg.	D ₄	326.691	1071.819	Near Selah, Wash.	X ₁	347.150	1138.942
Do.	E ₄	326.011	1069.588	Near Wenas, Wash.	Y ₁	334.590	1097.734
Do.	F ₄	327.838	1075.582	North Yakima Wash.	1067 T.	325.342	1067.393
Do.	1074 A.	328.580	1078.017	Do.	Z ₁	324.673	1065.198
Near Pendleton, Oreg.	G ₄	334.778	1098.350	Do.	A ₂	325.445	1067.730
Do.	H ₄	357.796	1173.869	Do.	B ₂	323.912	1062.701
Near Fulton, Oreg.	I ₄	422.895	1387.448	Do.	C ₂	325.759	1068.761
Near McCormack, Oreg.	J ₄	503.702	1652.503	Near Yakima City, Wash.	D ₂	290.346	952.577
Near Warren, Oreg.	K ₄	530.165	1739.393	Wapato, Wash.	855 T.	260.703	855.323
Near Helix, Oreg.	L ₄	548.335	1798.995	Do.	E ₂	260.251	853.840
Near Smeltz, Oreg.	M ₄	542.790	1780.804	Near Wapato, Wash.	F ₂	247.735	812.777
Do.	N ₄	507.167	1663.930	Toppenish, Wash.	755 T.	230.312	755.615
Near Stanton, Oreg.	O ₄	474.431	1556.529	Do.	G ₂	229.908	754.289
Near Ring, Oreg.	P ₄	317.716	1042.373	Do.	H ₂	230.495	756.215
Near Hunts Junction, Wash.	R ₄	244.664	802.701	Near Alfalfa, Wash.	717 T.	218.506	716.882
Do.	Q ₄	144.217	473.152	Alfalfa, Wash.	I ₂	217.828	714.657
Seattle, Wash.	Tidal 5.	6.564	21.536	Satus, Wash.	674 T.	205.495	674.195
Do.	Tidal 4.	6.664	19.862	Near Satus, Wash.	J ₂	203.904	668.975
Do.	G.	7.654	25.111	Near Mabton, Wash.	717 T.	218.410	716.566
Do.	City 1.	7.570	24.836	Mabton, Wash.	715 T.	218.058	715.412
Do.	City 2.	3.336	10.945	Near Mabton, Wash.	K ₂	217.452	713.424
South Seattle, Wash.	City 3.	3.139	10.299	Byron, Wash.	696 T.	212.318	696.580
Near Argo, Wash.	N. P.	6.146	20.164	Near Byron, Wash.	L ₂	210.683	691.216
Near Black River, Wash.	N. P.	6.524	21.404	Prosser, Wash.	M ₂	201.479	661.019
				Do.	661 T.	201.618	661.475
				Do.	N ₂	203.406	667.342
				Do.	O ₂	201.672	661.653
				Near Prosser, Wash.	P ₂	205.331	673.656
				Gibbon, Wash.	627 T.	191.252	627.466

* Reported disturbed.

† Elevation as originally determined.

‡ Elevation after relocation in 1907. The difference in elevation between the old position of the bench mark and the new was determined by the engineers of the Chicago, Milwaukee & St. Paul Railway.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Chandler, Wash.	534 T.	162.916	534.500	Alexandria, Minn.	I.	423.890	1390.713
Near Kiona, Wash.	Q.	148.484	487.151	Do.	J.	424.896	1392.373
Kiona, Wash.	515 T.	156.944	514.907	Do.	K.	427.928	1403.961
Do.	R.	156.711	514.143	Do.	Alexandria Magnetic Station.	428.504	1405.830
Near Kiona, Wash.	S.	164.360	539.238	Do.	L.	431.356	1415.207
Near Badger, Wash.	640 T.	195.216	640.471	Do.	City.	439.977	1443.994
Badger, Wash.	T.	203.248	668.666	Near Garfield, Minn.	M.	423.177	1388.374
Near Badger, Wash.	605 T.	184.478	605.242	Garfield, Minn.	N.	433.534	1422.353
Relief, Wash.	567 T.	172.842	567.065	Near Brandon, Minn.	O.	430.346	1411.893
Near Relief, Wash.	U.	171.712	563.339	Do.	P.	430.147	1411.241
Kennewick, Wash.	V.	112.089	367.745	Do.	Q.	432.020	1417.385
Do.	362 T.	110.312	361.916	Brandon, Minn.	R.	422.764	1387.019
Do.	W.	108.258	355.176	Evansville, Minn.	S.	414.271	1359.154
Near Kennewick, Wash.	X.	107.382	352.303	Do.	T.	414.230	1359.020
Near Pasco, Wash.	Y.	107.308	352.059	Erdahl, Minn.	U.	385.686	1265.371
Do.	Z.	114.847	378.794	Thorsborg, Minn.	V.	385.833	1265.584
Pasco, Wash.	378 T.	115.222	378.025	Near Elbow Lake, Minn.	Elbow A.	389.067	1276.432
Do.	A.	115.277	378.204	Do.	B.	372.381	1224.729
Near Pasco, Wash.	B.	108.966	357.499	Elbow Lake, Minn.	X.	369.573	1212.508
Do.	C.	109.008	357.637	Do.	Y.	368.450	1212.104
Do.	D.	109.000	357.610	Near Elbow Lake, Minn.	Z.	366.386	1202.052
Do.	E.	108.998	357.604	Do.	A.	363.000	1190.742
Do.	F.	109.008	357.637	Near Herford, Minn.	B.	344.032	1128.712
Do.	G.	108.992	357.585	Do.	C.	313.547	1028.685
Do.	H.	109.007	357.633	Tintah, Minn.	D.	303.734	996.501
Do.	I.	108.973	357.523	Do.	E.	304.976	1000.575
Near Hunts Junction, Wash.	341 A.	104.550	343.012	Near Tintah, Minn.	F.	301.989	990.776
Do.	J.	99.852	327.597	Near Yarmouth, Minn.	G.	300.820	985.319
Do.	K.	104.213	341.906	Do.	H.	299.062	981.173
Hunts Junction, Wash.	L.	99.016	324.855	Childs, Minn.	I.	297.084	974.831
Do.	M.	97.825	320.948	Near Fairmount, N. Dak.	A.	296.730	983.429
Near Hunts Junction, Wash.	N.	121.455	398.474	Do.	B.	297.325	975.474
Do.	O.	122.787	402.844	Do.	979 W.	*298.531	979.430
Do.	P.	127.431	418.080	Do.	979 W.	†298.298	978.666
				Do.	971 W.	291.491	970.113
				Near Childs, Minn.	Foss A.	296.807	973.774
				Do.	Foss Reference Mark.	296.005	973.090
				Do.	J.	295.548	969.543
East St. Cloud, Minn.	Hydrant 1.	316.122	1037.144	Near Fairmount, N. Dak.	969 W.	295.314	968.878
St. Cloud, Minn.	P. B. M. 41A.	312.488	1025.221	Fairmount, N. Dak.	C.	300.163	984.784
Do.	P. B. M. 41A, top of cap.	*313.695	1029.181	Do.	D.	296.000	984.545
Do.	P. B. M. 41A, top of cap.	†313.710	1029.231	Near Blackmer, N. Dak.	E.	296.515	972.416
Do.	A.	316.374	1037.971	Do.	F.	297.027	974.496
Do.	Hydrant 2.	315.900	1036.416	Do.	G.	296.824	973.830
Do.	Hydrant 3.	315.815	1036.136	White Rock, S. Dak.	A.	297.124	974.830
Do.	Hydrant 4.	316.685	1038.991	Do.	B.	297.480	975.962
Do.	B.	319.638	1048.679	Do.	C.	296.493	972.750
Near St. Cloud, Minn.	C.	319.368	1047.794	Near White Rock, S. Dak.	K.	301.786	990.110
Do.	D.	317.936	1043.095	Do.	L.	307.074	1007.459
St. Joseph, Minn.	E.	332.210	1089.925	Near Wheaton, Minn.	M.	315.714	1035.805
Collegeville, Minn.	F.	333.928	1095.562	Near White Rock, S. Dak.	Oscarson A.	317.129	1040.447
Do.	G.	333.659	1094.680	Do.	Oscarson Reference Mark.	316.303	1037.737
Near Avon, Minn.	H.	344.662	1130.779	Wheaton, Minn.	N.	310.859	1019.876
Avon, Minn.	I.	344.957	1131.747	Do.	City.	310.763	1019.561
Do.	J.	344.324	1129.669	Do.	O.	310.951	1020.178
Near Albany, Minn.	K.	360.703	1183.406	Near Wheaton, Minn.	P.	312.070	1023.850
Albany, Minn.	Hydrant 5.	368.152	1207.846	Near Dumont, Minn.	Q.	317.020	1040.090
Do.	L.	367.674	1206.277	Dumont, Minn.	R.	318.885	1046.299
Freeport, Minn.	M.	377.924	1239.906	Do.	S.	317.303	1041.019
Do.	N.	379.028	1243.528	Near Dumont, Minn.	T.	320.450	1051.343
Near Melrose, Minn.	Hydrant 6.	379.746	1245.884	Collis, Minn.	U.	324.654	1065.135
Melrose, Minn.	O.	360.120	1181.494	Near Collis, Minn.	V.	325.138	1070.162
Do.	P.	369.078	1210.884	Near Graceville, Minn.	W.	329.074	1079.637
Do.	City 1.	369.923	1213.655	Do.	X.	335.387	1100.349
Do.	City 2.	369.942	1213.718	Graceville, Minn.	City.	338.799	1111.543
Do.	City 3.	370.071	1214.141	Do.	Y.	338.464	1110.444
Do.	City 4.	369.654	1212.773	Do.	Z.	338.760	1111.415
Do.	Q.	367.926	1207.104	Do.	A.	337.647	1107.763
Near Melrose, Minn.	R.	369.456	1212.124	Near Graceville, Minn.	B.	338.533	1110.671
Near Sauk Center, Minn.	S.	381.970	1253.180	Do.	C.	348.131	1142.160
Do.	T.	383.484	1258.147	Do.	D.	352.633	1156.930
Do.	Hydrant 7.	383.723	1258.931	Near Clinton, Minn.	E.	360.918	1184.112
Do.	Hydrant 8.	382.799	1255.899	Clinton, Minn.	F.	354.028	1161.507
Do.	Hydrant 9.	381.642	1252.104	Do.	G.	354.132	1161.848
Near West Union, Minn.	V.	391.562	1284.649	Near Clinton, Minn.	H.	349.405	1146.339
West Union, Minn.	W.	406.186	1332.629	Near Ortonville, Minn.	I.	351.677	1153.793
Do.	X.	408.496	1340.207	Do.	J.	358.202	1199.585
Near West Union, Minn.	Y.	408.094	1338.889	Do.	K.	336.217	1103.072
Near Osakis, Minn.	Z.	414.289	1359.213	Ortonville, Minn.	L.	311.401	1021.655
Do.	A.	424.258	1391.919	Do.	U. S. E. 1.	298.221	978.413
Do.	Osakis A.	428.028	1404.288	Do.	U. S. E. 2.	295.179	968.433
Osakis, Minn.	B.	409.733	1344.266	Do.	U. S. E. 3.	295.946	970.949
Do.	C.	411.809	1351.076	Near Bigstone City, S. Dak.	D.	296.636	973.213
Do.	D.	410.330	1346.224	Do.	E.	319.851	1049.377
Near Osakis, Minn.	E.	423.196	1388.456	Do.	F.	319.643	1048.696
Near Nelson, Minn.	F.	411.610	1350.424	Near Milbank, S. Dak.	G.	324.201	1064.597
Nelson, Minn.	G.	416.912	1367.819	Do.	H.	349.185	1145.618
Near Alexandria, Minn.	Alexandria A.	450.870	1479.229	Milbank, S. Dak.	I.	350.591	1150.230
Do.	Alexandria Reference Mark.	450.373	1477.599	Near Milbank, S. Dak.	J.	350.562	1150.135
Do.	H.	431.202	1414.702	Near Twin Brooks, S. Dak.	K.	377.638	1238.968
				Twin Brooks, S. Dak.	L.	384.515	1261.530
				Stockholm, S. Dak.	M.	506.927	1663.143

* Original elevation.

† Elevation as reset.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
South Shore, S. Dak.	N.	567.649	1862.361	Baltic, S. Dak.	C.	448.968	1472.989
Do.	O.	560.220	1870.402	Near Baltic, S. Dak.	D.	444.807	1459.338
Near South Shore, S. Dak.	Mound A.	634.442	2081.498	Do.	E.	443.039	1453.537
Do.	Mound Reference Mark.	625.730	2052.916	Do.	F.	442.346	1451.263
Near Forestville, S. Dak.	P.	578.206	1896.998	Renner, S. Dak.	G.	438.122	1437.405
Near Watertown, S. Dak.	Q.	543.717	1783.845	Do.	H.	437.559	1435.558
Do.	R.	530.101	1739.173	Near Sioux Falls, S. Dak.	I.	433.870	1423.455
Do.	S.	526.638	1727.817	Do.	J.	433.148	1421.087
Watertown, S. Dak.	T.	530.246	1739.649	Sioux Falls, S. Dak.	City 1.	425.818	1397.038
Do.	City 1.	530.533	1740.590	Do.	City 2.	427.360	1402.097
Do.	U.	528.993	1735.538	Do.	City 4.	427.090	1401.211
Do.	City 2.	530.408	1740.180	Do.	L.	428.459	1405.703
Do.	Watertown Magnetic Station.	528.435	1733.707	Do.	City 3.	430.260	1411.611
				Do.	U. S. G. S. Astro- nomic Station.	434.317	1424.922
Watertown, S. Dak.	V.	523.563	1717.723	Do.	K.	427.067	1401.136
Near Grover, S. Dak.	W.	532.351	1746.555	Near Harrisburg, S. Dak.	1484 YNKTN.	452.192	1483.566
Grover, S. Dak.	X.	530.414	1740.200	Do.	M.	450.589	1475.307
Near Grover, S. Dak.	Y.	523.458	1717.378	Harrisburg, S. Dak.	N.	441.658	1449.006
Hazel, S. Dak.	Z.	538.554	1766.906	Near Harrisburg, S. Dak.	1419 YNKTN.	435.464	1428.684
Do.	A.	538.494	1766.709	Do.	P.	432.434	1418.744
Do.	B.	536.402	1759.846	Do.	Q.	422.500	1386.152
Near Hazel, S. Dak.	C.	546.294	1792.312	Near Canton, S. Dak.	R.	424.172	1391.637
Do.	D.	545.976	1791.256	Canton, S. Dak.	S.	408.435	1340.007
Near Vienna, S. Dak.	E.	546.031	1791.437	Do.	T.	388.068	1273.186
Do.	F.	557.759	1829.915	Beloit, Iowa.	A.	386.539	1268.170
Vienna, S. Dak.	G.	557.763	1829.927	Do.	B.	379.226	1244.911
Near Vienna, S. Dak.	H.	553.781	1816.863	Near Beloit, Iowa.	C.	380.059	1246.911
Near Bryant, S. Dak.	I.	558.342	1831.827	Near Elm Springs, Iowa.	D.	376.866	1236.435
Do.	J.	558.460	1832.214	Fairview, S. Dak.	U.	390.178	1280.109
Do.	S. C. 1.	562.495	1845.452	Near Fairview, S. Dak.	V.	370.074	1214.151
Bryant, S. Dak.	K.	561.969	1843.727	Do.	W.	368.296	1208.318
Do.	L.	564.321	1851.443	Do.	X.	369.313	1211.655
Near Bryant, S. Dak.	M.	557.495	1829.048	Near Austin, Iowa.	Y.	367.298	1205.044
Do.	S. C. 2.	546.780	1793.894	Hudson, S. Dak.	E.	365.856	1200.313
Erwin, S. Dak.	N.	567.723	1862.605	Do.	F.	372.744	1222.911
Near Erwin, S. Dak.	O.	560.845	1840.039	Near Hudson, S. Dak.	Z.	372.528	1221.546
Do.	P.	550.191	1805.085	Do.	A.	369.588	1212.557
Near Lake Preston, S. Dak.	Q.	519.070	1702.982	Near Hawarden, Iowa.	B.	365.522	1199.217
Lake Preston, S. Dak.	R.	525.285	1723.373	Do.	C.	360.455	1182.593
Do.	S.	524.044	1719.301	Calliope, Iowa.	G.	358.899	1177.488
Do.	Preston.	524.002	1719.163	Hawarden, Iowa.	H.	360.142	1181.566
Near Lake Preston, S. Dak.	T.	525.260	1719.729	Do.	I.	359.863	1180.650
Do.	U.	515.841	1692.388	Near Hawarden, Iowa.	City.	358.856	1177.347
Do.	S. C. 3.	522.190	1713.218	Do.	J.	357.432	1172.675
Do.	Hansen A.	529.162	1736.093	Do.	K.	357.003	1171.267
Do.	Hansen Reference Mark.	526.954	1728.848	Do.	L.	355.203	1165.361
Oldham, S. Dak.	V.	524.412	1720.508	Chatsworth, Iowa.	M.	352.168	1155.405
Do.	W.	525.369	1726.404	Do.	N.	353.518	1159.833
Near Oldham, S. Dak.	X.	526.804	1728.356	Do.	O.	354.103	1161.753
Do.	Y.	527.244	1729.800	Near Chatsworth, Iowa.	P.	351.846	1154.348
Ramona, S. Dak.	Z.	549.595	1803.130	Near Akron, Iowa.	Q.	347.058	1138.640
Near Ramona, S. Dak.	A.	548.779	1800.452	Akron, Iowa.	R.	349.388	1146.283
Do.	B.	548.098	1798.218	Do.	City.	349.038	1145.135
Do.	C.	541.649	1777.060	Near Akron, Iowa.	S.	346.358	1136.343
Do.	D.	539.640	1737.661	Do.	T.	345.900	1134.841
Do.	S. C. 4.	527.031	1729.101	Near Westfield, Iowa.	U.	344.200	1129.262
Do.	S. C. 5.	539.188	1769.018	Do.	V.	344.402	1129.920
Do.	S. C. 6.	547.488	1796.217	Do.	W.	341.967	1121.937
Do.	E.	563.507	1848.772	Do.	X.	343.579	1127.225
Do.	S. C. 7.	558.572	1832.582	Do.	Y.	340.270	1116.369
Do.	Crane Reference Mark	553.158	1814.819	Do.	Z.	340.794	1118.088
Do.	Crane A.	565.413	1855.026	Near Elk Point, S. Dak.	C.	341.833	1121.497
Near Madison, S. Dak.	F.	528.250	1733.100	Elk Point, S. Dak.	P. B. M. 41a.	342.325	1123.112
Madison, S. Dak.	G.	513.226	1683.809	Near Elk Point, S. Dak.	D.	343.192	1125.956
Do.	H.	510.036	1673.343	Do.	E.	341.937	1121.838
Do.	I.	510.855	1676.030	Do.	F.	340.082	1115.752
Do.	City 2.	509.408	1671.283	Jefferson, S. Dak.	G.	339.202	1112.866
Do.	City 3.	509.189	1670.564	Do.	P. B. M. 41a.	338.077	1109.180
Near Madison, S. Dak.	J.	521.260	1710.167	Do.	H.	339.979	1115.408
Do.	K.	519.789	1705.341	Near Jefferson, S. Dak.	I.	339.674	1114.414
Wentworth, S. Dak.	L.	518.544	1694.685	Do.	J.	339.340	1113.318
Do.	M.	516.028	1693.002	Do.	K.	338.422	1110.306
Near Wentworth, S. Dak.	N.	512.024	1679.866	McCook, S. Dak.	L.	337.531	1107.389
Colman, S. Dak.	O.	516.825	1695.617	Do.	P. B. M. 41a.	336.827	1105.074
Near Colman, S. Dak.	P.	517.447	1697.657	Near McCook, S. Dak.	M.	337.490	1107.248
Do.	Q.	524.116	1719.538	Do.	N.	336.114	1102.734
Do.	R.	512.568	1681.650	Near Sioux City, Iowa.	P. B. M. 399.	334.783	1098.368
Do.	S.	505.722	1659.190	Do.	Top of cap over same	336.004	1102.374
Near Egan, S. Dak.	T.	461.347	1513.603	Do.	P. B. M. 398.	336.139	1102.816
Do.	U.	460.725	1511.562	Do.	Top of cap over same	337.361	1106.825
Near Trent, S. Dak.	S. C. 8.	458.112	1502.989	Near Evansville, Minn.	M.	417.053	1368.281
Trent, S. Dak.	V.	457.187	1499.854	Melby, Minn.	N.	389.276	1277.150
Near Trent, S. Dak.	W.	454.123	1489.902	Near Melby, Minn.	O.	372.619	1222.500
Dell Rapids, S. Dak.	X.	456.157	1496.575	Ashby, Minn.	P.	394.501	1294.292
Do.	City 1.	457.214	1500.043	Do.	Q.	395.708	1298.252
Do.	Y.	456.725	1498.442	Near Ashby, Minn.	R.	383.867	1259.404
Do.	City 2.	456.906	1499.033	Dalton, Minn.	S.	420.934	1381.015
Do.	Z.	453.992	1488.488	Do.	Dalton Astronomic Station.	419.624	1376.716
Near Dell Rapids, S. Dak.	A.	454.694	1491.634	Do.	T.	416.117	1365.210
Do.	B.	449.949	1476.208	Near Dalton, Minn.	Dalton A.	422.988	1387.425
Do.	S. C. 9.	449.028	1473.180	Do.	U.	378.600	1242.123

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Parkdale, Minn.	V ₁	375.545	1232.101	Elgin, Tex.	576 S. A.	173.128	568.004
Near Fergus Falls, Minn.	W ₁	367.115	1204.443	Littig, Tex.	K ₁	140.341	460.101
Fergus Falls, Minn.	X ₁	364.014	1194.270	Manor, Tex.	L ₁	183.042	599.783
Do	Y ₁	364.107	1194.575	Daffan, Tex.	M ₁	183.453	602.440
Do	City	362.491	1189.273	Near Austin, Tex.	N ₁	137.145	449.956
Do	Z ₁	363.173	1191.510	Austin, Tex.	Geol. Austin	141.897	465.541
Near Fergus Falls, Minn.	A ₁	366.341	1201.603	Do	P ₁	146.092	479.304
Do	B ₁	359.935	1180.887	Do	O ₁	140.448	460.314
Carlisle, Minn.	C ₁	373.056	1223.935	Do	North Meridian Mark	166.100	544.947
Near Carlisle, Minn.	D ₁	373.142	1224.217	Do	508 Austin	153.043	502.109
Near Rothsay, Minn.	E ₁	421.563	1383.078	Near Austin, Tex.	476 Austin	143.243	469.956
Rothsay, Minn.	F ₁	363.971	1194.128	Do	Barton A	315.700	1035.759
Do	G ₁	365.330	1200.195				
Do	H ₁	368.568	1209.210				
Near Rothsay, Minn.	I ₁	343.822	1128.023	Elgin, Tex.	H ₁	175.252	574.973
Lawndale, Minn.	J ₁	325.724	1068.646	Near Elgin, Tex.	I ₁	166.068	544.841
Near Lawndale, Minn.	K ₁	317.670	1042.223	Near Sayers, Tex.	J ₁	121.969	399.879
Near Barnesville, Minn.	L ₁	314.931	1033.236	Do	Q ₁	130.810	428.188
Do	M ₁	312.316	1024.656	Do	449 S. A.	134.417	441.000
Barnesville, Minn.	N ₁	315.177	1034.043	Near Bastrop, Tex.	460 S. A.	137.939	452.553
Do	O ₁	312.270	1024.505	Do	R ₁	132.204	433.938
Near Barnesville, Minn.	P ₁	290.156	951.953	Do	365 S. A.	108.937	357.404
Do	Q ₁	301.126	987.944	Bastrop, Tex.	372 Bastrop	111.728	368.561
Downer, Minn.	R ₁	294.339	965.677	Do	Geol. Bastrop	111.999	367.450
Do	S ₁	294.903	967.527	Do	377 Bastrop	113.247	371.545
Near Downer, Minn.	T ₁	290.748	953.896	Do	S ₁	113.393	372.024
Near Crawford, Minn.	U ₁	283.466	930.005	Near Bastrop, Tex.	T ₁	109.162	358.142
Near Glyndon, Minn.	V ₁	281.602	923.889	Hills Prairie, Tex.	359 Hills Prairie	107.749	353.507
Glyndon, Minn.	W ₁	281.329	922.993	Upton, Tex.	U ₁	101.822	334.061
Near Averill, Minn.	X ₁	279.257	916.196	Near Upton, Tex.	349 Upton	104.712	343.543
Averill, Minn.	Y ₁	279.391	916.635	Smithville, Tex.	V ₁	109.962	360.767
Near Felton, Minn.	Z ₁	279.316	916.390	Do	329 Smithville	98.070	323.720
Felton, Minn.	A ₁	277.993	912.048	Do	W ₁	100.622	330.124
Do	B ₁	277.875	911.662	Do	X ₁	100.658	330.242
Near Borup, Minn.	C ₁	277.055	908.972	Near Smithville, Tex.	Y ₁	99.525	326.525
Borup, Minn.	D ₁	276.820	908.301	Do	433 S. A.	129.664	425.406
Do	E ₁	277.043	908.932	Do	460 S. A.	137.936	452.545
Wheatville, Minn.	F ₁	275.472	903.778	Do	Z ₁	150.508	493.702
Ada, Minn.	G ₁	276.625	907.560	Rosanky, Tex.	512 S. A.	153.729	504.359
Do	U. S. G. S. Meridian Mark.	275.749	904.686	Near Hemkens, Tex.	451 S. A.	134.950	442.748
Do	H ₁	276.263	906.372	Do	T. B. M. 117	136.046	446.344
Do	I ₁	275.769	904.752	Do	A ₁	135.952	446.035
Hadler, Minn.	J ₁	274.443	900.401	Red Rock, Tex.	491 S. A.	147.148	482.768
Near Hadler, Minn.	K ₁	275.980	905.444	Bateman, Tex.	B ₁	144.027	472.529
Lockhart, Minn.	L ₁	272.019	892.449	Near Dale, Tex.	C ₁	152.427	498.688
Beltrami, Minn.	M ₁	275.407	903.504	Near Lockhart, Tex.	D ₁	130.791	429.103
Do	N ₁	275.610	904.230	Lockhart, Tex.	Geol. Lockhart	153.834	504.704
Near Beltrami, Minn.	O ₁	274.517	900.644	Do	E ₁	160.254	525.766
Russia, Minn.	P ₁	272.303	893.380	Near Lockhart, Tex.	F ₁	159.747	524.103
Near Russia, Minn.	Q ₁	271.124	889.513	Near Clear Fork, Tex.	G ₁	162.831	534.222
Kittson, Minn.	R ₁	269.366	883.745	Maxwell, Tex.	Geol. Clear Fork	173.659	569.747
Near Kittson, Minn.	S ₁	268.247	880.074	Near Maxwell, Tex.	Geol. Maxwell	184.074	602.016
Do	T ₁	267.986	879.217	Near Reedville, Tex.	H ₁	177.680	582.938
Crookston, Minn.	U ₁	264.923	869.168	Do	100 S. A.	177.091	581.006
Do	V ₁	266.238	873.483	San Marcos, Tex.	I ₁	178.334	585.084
Do	City	264.485	867.731	Do	J ₁	188.596	618.752
Do	W ₁	271.591	891.045	Do	K ₁	189.988	623.319
Near Crookston, Minn.	X ₁	271.684	891.350	Near San Marcos, Tex.	585 San Marcos	176.100	577.755
Shirley, Minn.	Y ₁	275.186	902.839	Near Hunter, Tex.	L ₁	205.077	672.823
Near Shirley, Minn.	Z ₁	275.257	903.073	Do	627 Yorks	189.481	621.656
Near Euclid, Minn.	A ₁	273.848	898.450	Do	M ₁	197.796	648.936
Euclid, Minn.	B ₁	271.611	891.111	Goodwin, Tex.	N ₁	210.440	690.418
Near Euclid, Minn.	C ₁	270.458	887.328	Do	695 S. A.	210.365	690.173
Near Angus, Minn.	D ₁	262.044	859.723	Near New Braunfels, Tex.	T ₁	187.743	615.953
Angus, Minn.	E ₁	265.656	871.573	Do	Seguin West Base	189.104	620.418
Near Angus, Minn.	F ₁	264.897	869.083	Near Seguin, Tex.	Seguin East Base	181.883	596.728
Warren, Minn.	G ₁	260.270	853.903	Near New Braunfels, Tex.	O ₁	190.288	624.391
Do	H ₁	261.252	857.124	Do	638 Comal	193.028	633.293
Do	I ₁	261.085	856.576	New Braunfels, Tex.	P ₁	194.679	638.709
Do	J ₁	261.344	857.426	Do	Q ₁	193.622	635.242
Near Warren, Minn.	K ₁	260.066	853.233	Do	R ₁	192.180	630.511
Near Argyle, Minn.	L ₁	258.198	847.105	Do	S ₁	193.183	633.801
Argyle, Minn.	M ₁	257.783	845.743				
Do	N ₁	259.119	850.127	Primms Spur, Tex.	316 Primms Spur	94.686	310.646
Near Argyle, Minn.	O ₁	259.848	852.518	Near Kirtley, Tex.	U ₁	94.982	311.620
Near Stephen, Minn.	P ₁	255.133	837.049	West Point, Tex.	292 West Point	87.355	286.598
Stephen, Minn.	Q ₁	253.267	830.927	Do	V ₁	90.317	296.315
Do	R ₁	253.354	831.212	Plum, Tex.	W ₁	91.317	299.590
Do	S ₁	252.658	828.928	Do	X ₁	91.280	299.474
Near Stephen, Minn.	T ₁	253.227	830.795	Near La Grange, Tex.	Y ₁	86.125	282.562
Do	Stephen West Base A	253.115	830.428	La Grange, Tex.	Z ₁	82.191	269.655
				Do	A ₁	82.038	269.153
Near Holland, Tex.	W ₁	154.684	507.493	Do	B ₁	81.000	264.307
Holland, Tex.	Z ₁	*160.506	526.593	Near Halsted, Tex.	C ₁	80.383	263.659
Near Bartlett, Tex.	A ₁	180.196	591.193	Halsted, Tex.	D ₁	94.057	308.585
Granger, Tex.	B ₁	175.457	575.645	Fayetteville, Tex.	E ₁	127.249	417.483
Do	C ₁	175.427	575.547	Do	F ₁	121.089	393.992
Near Circleville, Tex.	D ₁	164.576	539.947	Boggy Tank, Tex.	G ₁	82.634	271.108
Taylor, Tex.	E ₁	166.002	544.625	Near New Ulm, Tex.	H ₁	109.433	359.032
Do	F ₁	168.437	552.614	New Ulm, Tex.	I ₁	122.557	402.080
Coupland, Tex.	G ₁	157.591	517.030	Do	J ₁	119.906	393.391
Near Coupland, Tex.	O ₁	160.359	526.111	Near New Ulm, Tex.	K ₁	110.185	360.499
				Cat Spring, Tex.	L ₁	92.578	302.723

* This is the elevation determined in November, 1903, after the bench mark had apparently settled about 0.071 meter between that time and the date of its establishment in April, 1903.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Sealy, Tex.	M ₇	69.047	226.532	Near Spankey, Ill.	P. B. M. 8	130.932	429.566
Do.	N ₇	65.604	215.516	Do.	Top of cap over same	132.144	433.542
Sealy, Tex.	O ₇	62.046	203.561	Do.	P. B. M. 9	137.024	449.553
Do.	P ₇	62.240	204.199	Eldred, Ill.	Top of cap over same	138.233	453.519
Do.	Q ₇	61.074	200.374	Do.	P. B. M. 10	142.452	467.361
Near San Felipe, Tex.	R ₇	45.029	147.733	Near Eldred, Ill.	Top of cap over same	143.657	471.315
Near McDowell, Tex.	S ₇	37.954	124.520	Do.	P. B. M. 11	144.474	473.995
Near Brookshire, Tex.	T ₇	36.605	120.095	Near Bridgewater, Ill.	Top of cap over same	145.684	477.965
Brookshire, Tex.	U ₇	49.521	162.470	Do.	P. B. M. 12	131.992	433.044
Near Brookshire, Tex.	V ₇	47.902	157.158	Do.	Top of cap over same	133.204	437.020
Near Katy, Tex.	W ₇	43.811	143.737	Do.	P. B. M. 13	131.536	431.548
Katy, Tex.	X ₇	43.085	141.355	Pegram, Ill.	Top of cap over same	132.743	435.508
Do.	Y ₇	43.430	142.487	Do.	P. B. M. 14	133.011	436.387
Near Katy, Tex.	Z ₇	40.992	134.488	Near Hillview, Ill.	Top of cap over same	134.210	440.321
Burnap, Tex.	A ₈	38.044	124.816	Do.	P. B. M. 15	143.847	471.938
Barker, Tex.	B ₈	32.149	105.476	Do.	Top of cap over same	145.058	475.911
Letitia, Tex.	C ₈	29.362	96.332	Do.	P. B. M. 16	134.662	441.804
Near Hillendahl, Tex.	D ₈	27.403	89.905	Near Glasgow, Ill.	Top of cap over same	135.860	445.734
Do.	E ₈	26.540	87.073	Do.	P. B. M. 17	135.019	442.975
Do.	F ₈	23.966	78.628	Near Bloomfield, Ill.	Top of cap over same	136.217	446.905
Do.	G ₈	21.894	71.831	Do.	P. B. M. 18	133.662	438.523
Eureka, Tex.	H ₈	20.908	68.595	Do.	Top of cap over same	134.871	442.489
Houston Heights, Tex.	I ₈	18.598	61.017	Do.	P. B. M. 19	136.002	446.200
Houston, Tex.	J ₈	13.718	45.006	Near Oxville, Ill.	Top of cap over same	137.207	450.153
Do.	K ₈	12.910	42.356	Do.	P. B. M. 20	142.303	466.872
Do.	L ₈	13.289	43.599	Bluffs, Ill.	Top of cap over same	143.505	470.816
Do.	City	13.967	45.824	Do.	P. B. M. 21	147.882	485.176
Near Houston, Tex.	M ₈	13.210	43.339	Near Bluffs, Ill.	Top of cap over same	149.077	489.097
Near Harrisburg, Tex.	N ₈	7.120	23.359	Do.	P. B. M. 22	145.322	476.777
Harrisburg, Tex.	R. M.	11.665	38.271	Near Meredosia, Ill.	Top of cap over same	146.519	480.704
Near Harrisburg, Tex.	O ₉	11.431	37.503	Do.	P. B. M. 23	137.148	449.960
Do.	M. M. 9	10.762	35.308	Near Lydda, Ill.	Top of cap over same	138.344	453.884
Do.	P ₉	11.670	38.287	Do.	P. B. M. 24	138.283	453.683
Near Genoa, Tex.	Q ₉	11.342	37.212	Near Beardstown, Ill.	Top of cap over same	139.478	457.604
Do.	M. M. 12	12.590	41.306	Do.	P. B. M. 25	134.073	439.871
Genoa, Tex.	R ₉	15.193	49.846	Do.	Top of cap over same	135.279	443.828
Do.	S ₉	14.338	47.040	Beardstown, Ill.	B. M.	136.008	446.220
Near Genoa, Tex.	M. M. 16	13.281	43.573	Do.	P. B. M. 26	135.439	444.353
Do.	M. M. 18	9.490	31.165	Do.	P. B. M. 27	135.232	443.674
Near Webster, Tex.	T ₉	9.603	31.506	Near Beardstown, Ill.	P. B. M. 28	135.863	445.744
Webster, Tex.	U ₉	8.199	26.940	Do.	Top of cap over same	137.063	449.681
Near Webster, Tex.	M. M. 22	8.212	26.943	Do.	P. B. M. 29	144.476	474.002
League City, Tex.	V ₉	7.177	23.547	Do.	Top of cap over same	145.682	477.958
Near League City, Tex.	W ₉	6.995	22.949	Do.	P. B. M. 30	147.693	484.556
Near Dickinson, Tex.	X ₉	5.493	18.033	Near Chandlerville, Ill.	Top of cap over same	148.894	488.496
Dickinson, Tex.	Y ₉	5.679	18.632	Do.	P. B. M. 31	140.151	459.812
Near Dickinson, Tex.	Z ₉	5.894	19.337	Chandlerville, Ill.	Top of cap over same	141.352	463.752
Near Lamarque, Tex.	M. M. 32	6.356	20.853	Do.	P. B. M. 32	143.834	471.895
Do.	M. M. 34	5.485	17.995	Saidora, Ill.	Top of cap over same	145.035	475.536
Lamarque, Tex.	A ₉	5.674	18.615	Do.	P. B. M. 33	139.742	458.470
Do.	B ₉	5.275	17.307	Bath, Ill.	Top of cap over same	140.946	462.420
Texas City Jct., Tex.	C ₉	2.585	8.481	Do.	P. B. M. 34	141.882	465.491
Near Texas City Jct., Tex.	M. M. 41	1.319	4.327	Do.	P. B. M. 35	140.499	460.954
Virginia Point, Tex.	D ₉	1.497	4.911	Do.	Top of cap over same	141.701	464.897
Near Galveston, Tex.	E ₉	0.741	2.431	Near Havana, Ill.	P. B. M. 36	144.355	473.605
Galveston, Tex.	F ₉	1.028	3.353	Do.	Top of cap over same	145.559	477.555
Do.	G ₉	2.376	7.795	Havana, Ill.	P. B. M. 37	137.575	451.361
Do.	Tidal 19	2.940	9.646	Do.	P. B. M. 38	143.542	470.937
Do.	Tidal 18	1.733	5.686	Do.	P. B. M. 39	144.574	474.323
Do.	Tidal 17	2.576	8.451	Do.	P. B. M. 40	143.453	470.645
Do.	City	3.097	10.161	Near Havana, Ill.	P. B. M. 41	142.381	467.128
Do.	Tidal 16	1.882	6.175	Do.	Top of cap over same	143.589	471.092
Do.	Tidal 15	1.953	6.407	Do.	T. B. M. 186	135.821	445.606
Do.	Tidal 14	1.924	6.312	Near Liverpool, Ill.	P. B. M. 42	146.697	481.288
Do.	Tidal 13	2.379	7.805	Do.	Top of cap over same	147.899	485.232
Do.	Tidal 12	2.606	8.550	Near Topeka, Ill.	P. B. M. 43	150.606	494.113
Do.	Tidal 11	2.490	8.169	Do.	Top of cap over same	151.809	498.060
Do.	Tidal 10	2.614	8.576	Near Manito, Ill.	P. B. M. 44	156.209	512.496
Do.	Tidal 9	0.964	3.162	Do.	Top of cap over same	157.418	516.462
Do.	Tidal 4	2.451	8.041	Near Marshalls Landing, Ill.	P. B. M. 45	155.652	510.668
Do.	Tidal 3	2.299	7.543	Do.	Top of cap over same	156.857	514.622
Do.	Tidal 2	1.628	5.341	Do.	P. B. M. 46	155.059	508.723
Do.	Tidal 8	2.602	8.537	Do.	Top of cap over same	156.264	512.676
Do.	Tidal 7	2.576	8.451	Near Gales Landing, Ill.	P. B. M. 47	136.945	449.294
Do.	Tidal 6	2.410	7.906	Do.	Top of cap over same	138.155	453.264
Do.	Tidal 5	1.042	3.419	Near Stoehrs, Ill.	T. B. M. 228	138.473	454.307
Near Grafton, Ill.	T. B. M. 2	132.896	436.010	Do.	U. S. G. S.	138.474	454.310
Do.	P. B. M. 1	136.494	447.814	Near Pekin, Ill.	P. B. M. 48	142.587	467.804
Do.	Top of cap over same	137.714	451.817	Do.	Top of cap over same	143.788	471.744
Near Rosedale, Ill.	T. B. M. 8	134.110	439.969	Do.	T. B. M. 235	141.034	462.709
Do.	T. B. M. 9	134.290	440.583	Pekin, Ill.	T. B. M. 237	137.522	451.187
Do.	P. B. M. 2	138.558	454.586	Do.	P. B. M. 49	138.813	455.422
Do.	T. B. M. 10	136.280	447.112	Do.	T. B. M. 238	141.155	463.106
Do.	P. B. M. 3	132.004	433.083	Near Pekin, Ill.	T. B. M. 239	142.031	465.900
Do.	Top of cap over same	133.220	437.073	Do.	T. B. M. 240	141.092	462.899
Near Nutwood, Ill.	P. B. M. 4	132.035	433.185	Do.	P. B. M. 50	140.630	461.384
Nutwood, Ill.	P. B. M. 5	132.232	433.831	Do.	Top of cap over same	141.834	465.334
Do.	Top of cap over same	133.450	437.827	Wesley, Ill.	P. B. M. 51	136.292	447.151
Near Spankey, Ill.	P. B. M. 6	128.322	421.003	Do.	Top of cap over same	137.500	451.115
Do.	Top of cap over same	129.536	424.986	Wesley Junction, Ill.	T. B. M. 249	138.387	454.025
Spankey, Ill.	P. B. M. 7	134.303	440.626	Peoria, Ill.	P. B. M. 52	139.158	456.554
Do.	Top of cap over same	135.516	444.605	Do.	T. B. M. 250	139.097	456.354
Near Spankey, Ill.	T. B. M. 27	136.303	447.187	Do.	T. B. M. 251	138.920	455.773
				Do.	T. B. M. 253	139.847	458.815
				Do.	B. M.	139.849	458.821

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Peoria, Ill.	P. B. M. 53.	137.951	452.594	Near Ottawa, Ill.	B. M. 62 (Seddon)	150.133	492.561
Do.	P. B. M. 54.	138.904	455.721	Do.	T. B. M. 366.	147.473	483.834
Do.	P. B. M. 254.	143.343	470.284	Do.	P. B. M. 85.	147.586	483.230
Averyville, Ill.	T. B. M. 256.	145.854	471.403	Do.	Top of cap over same	148.782	488.129
Near Peoria, Ill.	T. B. M. 257.	149.629	457.742	Marseilles, Ill.	T. B. M. 371.	149.941	491.931
Do.	P. B. M. 55.	138.244	453.539	Do.	P. B. M. 86.	146.884	481.902
Do.	Top of cap over same	139.452	457.519	Do.	T. B. M. 59 (Seddon)	149.425	490.239
Do.	B. M. 1 P.	138.147	453.237	Do.	P. B. M. 87.	151.554	497.221
Do.	T. B. M. 258.	141.627	464.955	Do.	B. M. (Ward 1902)	154.000	505.553
Do.	P. B. M. 56.	144.173	473.008	Near Marseilles, Ill.	P. B. M. 88.	152.922	501.712
Do.	Top of cap over same	145.383	476.977	Do.	Top of cap over same	154.128	505.668
Mossville, Ill.	P. B. M. 57.	142.652	468.017	Do.	B. M. 10 (Ward 1899)	152.410	500.032
Do.	Top of cap over same	143.854	471.961	Near Seneca, Ill.	T. B. M. 378.	152.625	500.737
Near Mossville, Ill.	P. B. M. 58.	139.923	459.064	Do.	B. M. 15 (Ward 1899)	152.414	500.045
Do.	Top of cap over same	141.125	463.011	Do.	T. B. M. 380.	156.032	511.915
Rome, Ill.	P. B. M. 59.	140.658	461.475	Do.	P. B. M. 89.	154.523	506.964
Do.	Top of cap over same	141.853	465.296	Do.	Top of cap over same	155.731	510.927
Chillicothe, Ill.	P. B. M. 60.	148.102	485.898	Do.	P. B. M. 90.	154.632	507.322
Near Chillicothe, Ill.	Top of cap over same	149.314	489.874	Do.	Top of cap over same	155.842	511.292
Do.	T. B. M. 283.	146.998	482.276	Near Morris, Ill.	P. B. M. 91.	154.702	507.551
Do.	P. B. M. 61.	145.858	478.536	Do.	Top of cap over same	155.959	511.675
Do.	P. B. M. 62.	140.163	459.851	Morris, Ill.	T. B. M. 394.	153.992	505.222
Do.	Top of cap over same	141.370	463.811	Do.	T. B. M. 395.	154.904	508.214
Near Sparland, Ill.	T. B. M. 291.	141.485	464.189	Do.	P. B. M. 92.	153.638	504.061
Sparland, Ill.	P. B. M. 63.	138.906	455.727	Do.	B. M. 45 A (Seddon)	155.065	508.742
Do.	Top of cap over same	140.112	459.684	Do.	B. M. 45 B (Seddon)	148.538	487.328
Near Sparland, Ill.	T. B. M. 293.	138.576	454.445	Near Morris, Ill.	T. B. M. 398.	154.241	505.039
Near Henry, Ill.	P. B. M. 64.	143.484	470.747	Do.	T. B. M. 400.	155.039	508.657
Do.	Top of cap over same	144.688	474.697	Do.	P. B. M. 93.	151.896	498.245
Do.	T. B. M. 297.	142.115	466.256	Do.	Top of cap over same	153.104	500.300
Do.	T. B. M. 299.	148.615	487.581	Do.	T. B. M. 402.	152.976	501.889
Do.	P. B. M. 65.	148.490	487.171	Do.	P. B. M. 94.	156.311	512.830
Do.	Top of cap over same	149.691	491.111	Do.	B. M. 39 (Seddon)	156.318	512.853
Do.	T. B. M. 303.	158.769	520.895	Do.	P. B. M. 95.	154.765	507.758
Do.	T. B. M. 304.	159.218	522.368	Do.	Top of cap over same	155.972	511.718
Near Putnam, Ill.	P. B. M. 66.	157.691	517.358	Do.	T. B. M. 404.	152.786	501.265
Do.	Top of cap over same	158.888	521.285	Near Channahon, Ill.	T. B. M. 405.	155.373	509.753
Putnam, Ill.	P. B. M. 67.	159.354	522.814	Do.	B. M. 38 A (Seddon)	159.310	522.670
Do.	Top of cap over same	160.565	526.787	Do.	P. B. M. 96.	160.042	525.071
Near Putnam, Ill.	P. B. M. 68.	143.794	471.764	Do.	Top of cap over same	161.249	529.031
Do.	Top of cap over same	144.993	475.698	Channahon, Ill.	P. B. M. 97.	159.150	522.145
Near Bureau, Ill.	T. B. M. 314.	141.082	462.867	Do.	B. M.	159.154	522.158
Do.	T. B. M. 317.	143.046	469.310	Near Channahon, Ill.	P. B. M. 98.	160.081	525.199
Do.	P. B. M. 69.	139.856	458.844	Do.	Top of cap over same	161.287	529.156
Do.	Top of cap over same	141.059	462.791	Do.	S. D. 144.	164.482	539.638
Bureau, Ill.	T. B. M. 319.	143.984	472.388	Do.	S. D. 143.	165.070	541.567
Near Bureau, Ill.	T. B. M. 321.	142.999	469.156	Do.	P. B. M. 99.	157.447	516.557
Do.	P. B. M. 70.	143.605	471.144	Do.	Top of cap over same	158.650	520.964
Do.	Top of cap over same	144.805	475.081	Millsdale, Ill.	B. M. 25 A (Seddon)	155.366	509.730
Near Depue, Ill.	T. B. M. 324.	142.608	467.873	Do.	S. D. 141.	174.357	572.036
Do.	P. B. M. 71.	145.398	477.027	Near Joliet, Ill.	T. B. M. 424.	155.932	511.587
Do.	Top of cap over same	146.604	480.983	Do.	P. B. M. 100.	158.532	520.117
Near Marquette, Ill.	T. B. M. 328.	141.414	463.956	Do.	Top of cap over same	159.736	524.067
Do.	R. R. B. M.	141.365	463.795	Do.	T. B. M. 427.	159.100	522.765
Do.	T. B. M. 330.	140.814	461.987	Near Rockdale, Ill.	T. B. M. 429.	161.253	529.044
Near Spring Valley, Ill.	T. B. M. 332.	140.991	462.588	Do.	S. D. 135.	159.474	523.208
Do.	P. B. M. 72.	142.500	467.519	Do.	P. B. M. 101.	159.218	522.368
Do.	Top of cap over same	143.705	471.472	Do.	Top of cap over same	160.422	526.318
Do.	T. B. M. 333.	141.218	463.313	Do.	S. D. 130.	162.063	531.702
Spring Valley, Ill.	P. B. M. 73.	140.911	462.306	Near Rockdale, Ill.	P. B. M. 102.	158.327	519.444
Do.	Sanitary B. M.	141.715	464.943	Joliet, Ill.	T. B. M. 432.	166.335	545.717
Near Spring Valley, Ill.	T. B. M. 335.	140.987	462.555	Do.	T. B. M. 433.	164.956	541.913
Do.	P. B. M. 74.	139.793	458.638	Do.	P. B. M. 103.	164.024	538.135
Do.	Top of cap over same	140.997	462.588	Do.	S. D. 127.	166.173	545.186
Near Peru, Ill.	T. B. M. 336.	141.574	464.481	Do.	T. B. M. 434.	165.849	544.123
Do.	T. B. M. 337.	141.365	463.795	Do.	T. B. M. 435.	167.520	549.605
Peru, Ill.	T. B. M. 338.	143.598	471.121	Do.	P. B. M. 104.	167.332	545.888
Do.	P. B. M. 75.	139.890	458.956	Do.	T. B. M. 436.	166.099	544.943
Near Peru, Ill.	Sanitary B. M.	139.887	458.948	Do.	P. B. M. 105.	167.045	548.047
Do.	B. M. 70 A (Seddon).	136.689	448.454	Near Joliet, Ill.	P. B. M. 106.	168.860	554.002
Do.	B. M. 38 (1883).	136.673	448.401	Do.	S. D. 117.	170.532	559.487
Do.	P. B. M. 76.	142.683	468.119	Do.	T. B. M. 437.	170.763	560.245
Do.	T. B. M. 340.	140.589	461.249	Near Lockport, Ill.	T. B. M. 438.	173.579	560.484
Do.	Sanitary B. M.	140.682	461.554	Do.	S. D. 109.	173.585	560.503
Do.	P. B. M. 77.	148.670	487.761	Do.	S. D. 107.	177.250	581.528
Near Lasalle, Ill.	T. B. M. 343.	136.853	448.992	Do.	S. D. 106.	177.260	581.561
Do.	P. B. M. 78.	137.593	451.420	Do.	P. B. M. 107.	174.741	573.296
Near Utica, Ill.	Top of cap over same	138.799	455.376	Do.	P. B. M. 108.	174.974	574.061
Do.	T. B. M. 347.	138.576	454.645	Do.	S. D. 116.	183.542	602.172
Do.	B. M. 69 (Seddon)	138.579	454.655	Do.	S. D. 114.	178.349	587.132
Do.	U. S. B. M.	141.751	465.061	Do.	T. B. M. 440.	171.936	564.093
Do.	P. B. M. 79.	141.722	464.966	Do.	P. B. M. 109.	171.942	564.113
Do.	T. B. M. 348.	137.435	450.901	Do.	P. B. M. 110.	173.391	568.867
Do.	T. B. M. 349.	136.871	449.051	Do.	P. B. M. 111.	175.137	574.595
Do.	P. B. M. 80.	141.018	462.657	Near Lockport, Ill.	T. B. M. 441.	178.307	584.903
Do.	Top of cap over same	142.222	466.607	Do.	Sanitary B. M.	178.312	585.012
Near Ottawa, Ill.	P. B. M. 81.	145.515	477.410	Do.	T. B. M. 442.	178.302	584.970
Do.	P. B. M. 82.	140.840	462.073	Near Romeo, Ill.	T. B. M. 443.	178.290	584.940
Do.	Top of cap over same	142.045	466.026	Do.	T. B. M. 444.	177.938	583.782
Do.	T. B. M. 357.	147.901	485.219	Do.	P. B. M. 112.	177.756	583.188
Ottawa, Ill.	B. M. 64 (Seddon)	145.360	476.902	Romeo, Ill.	S. D. 94.	179.608	589.257
Do.	P. B. M. 83.	144.428	473.844	Do.	P. B. M. 113.	181.508	595.497
Do.	B. M. 63 (Seddon)	146.349	480.147	Do.	S. D. 93.	181.093	594.136
Do.	T. B. M. 361.	147.422	483.667	Do.	Sanitary B. M.	179.701	589.569
Do.	P. B. M. 84.	144.488	474.041	Near Romeo, Ill.	T. B. M. 445.	177.744	583.148
Near Ottawa, Ill.	T. B. M. 363.	150.122	492.525	Do.	T. B. M. 446.	177.642	582.814

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Romeo, Ill.	T. B. M. 447.	177.868	583.555	Chicago, Ill.	T. B. M. 483.	179.213	587.968
Near Lemont, Ill.	T. B. M. 449.	178.284	584.920	Do.	P. B. M. 136.	180.917	593.559
Do.	T. B. M. 450.	178.242	584.782	Do.	T. B. M. 484.	181.116	594.211
Lemont, Ill.	T. B. M. 451.	179.631	589.339	Do.	City 7.	180.845	593.322
Do.	P. B. M. 114.	181.093	594.136	Do.	T. B. M. 485.	181.109	594.188
Do.	P. B. M. 115.	179.866	590.110	Do.	P. B. M. 137.	180.789	593.139
Do.	S. D. 88.	184.534	605.425	Do.	P. B. M. 138.	181.134	594.270
Do.	S. D. 80.	184.176	604.251	Do.	P. B. M. 139.	181.171	594.392
Do.	S. D. 79.	179.125	587.679	Do.	T. B. M. 486.	179.892	590.196
Near Lemont, Ill.	T. B. M. 452.	178.372	585.209	Do.	T. B. M. 488.	180.802	593.181
Do.	P. B. M. 116.	178.288	584.933	Do.	P. B. M. 98.	182.417	598.480
Do.	T. B. M. 453.	178.336	585.091	Do.	City 9.	180.700	592.847
Do.	P. B. M. 117.	178.312	585.012	Do.	B. M. VII.	181.540	595.602
Do.	Lower Sanitary B. M.	178.322	585.045	Do.	B. M. VI.	181.444	595.288
Do.	Upper Sanitary B. M.	178.303	584.982	Do.	P. B. M. 96.	182.375	598.342
Do.	T. B. M. 454.	178.302	584.979	Pekin, Ill.	A = City.	146.028	479.094
Sag Bridge Station, Ill.	T. B. M. 455.	178.292	584.946	Do.	B.	146.024	479.080
Near Willow Springs, Ill.	T. B. M. 456.	178.303	584.982	Near Leslie, Ill.	D.	207.868	681.980
Do.	P. B. M. 118.	178.251	584.812	Tremont, Ill.	E.	196.116	643.424
Do.	S. D. 62.	179.793	589.871	Near Menert, Ill.	F.	175.454	575.635
Do.	S. D. 63.	180.618	592.578	Do.	G.	177.740	583.135
Do.	S. D. 64.	180.189	591.170	Mackinaw, Ill.	H.	196.974	646.239
Do.	T. B. M. 457.	178.337	585.094	Lilly, Ill.	I.	244.836	803.266
Do.	T. B. M. 458.	178.316	585.025	Woodruff, Ill.	J.	256.093	840.198
Do.	P. B. M. 119.	178.413	585.343	Danvers, Ill.	K.	246.666	809.270
Willow Springs, Ill.	T. B. M. 459.	181.362	595.018	Near Twin Grove, Ill.	L.	230.108	754.946
Do.	Sanitary B. M.	178.790	586.580	Twin Grove, Ill.	M.	248.845	816.419
Do.	S. D. 54.	184.484	605.261	Near Bloomington, Ill.	N.	227.467	746.281
Do.	S. D. 51.	182.323	598.171	Do.	O.	241.996	793.949
Do.	S. D. 50.	182.423	598.499	Bloomington, Ill.	P.	252.923	829.798
Do.	P. B. M. 120.	180.485	592.141	Near Gillum, Ill.	Q.	253.849	832.836
Do.	P. B. M. 121.	187.910	616.501	Gillum, Ill.	R.	250.063	820.415
Do.	S. D. 57.	186.406	611.567	Downs, Ill.	S.	242.094	794.270
Mount Forest, Ill.	T. B. M. 460.	180.794	593.155	Near Ford Woods, Ill.	T.	241.201	791.340
Do.	S. D. 49.	180.238	591.331	Le Roy, Ill.	U.	237.715	779.903
Do.	S. D. 48.	180.780	593.109	Empire, Ill.	V.	230.301	755.579
Near Mount Forest, Ill.	T. B. M. 461.	181.296	594.802	Near Farmer City, Ill.	W.	222.723	730.717
Do.	T. B. M. 462.	180.931	593.604	Farmer City, Ill.	X.	223.269	732.508
Near Summit, Ill.	T. B. M. 463.	181.016	593.883	Harris, Ill.	Y.	219.954	721.632
Do.	T. B. M. 464.	181.013	593.873	Mansfield, Ill.	Z.	221.678	727.289
Do.	T. B. M. 465.	180.811	593.211	Near Mahomet, Ill.	A.	219.963	721.662
Do.	P. B. M. 122.	181.302	594.822	Mahomet, Ill.	B.	217.054	712.118
Do.	S. D. 40.	180.923	593.578	Near Mahomet, Ill.	C.	223.580	733.529
Do.	S. D. 39.	183.722	602.761	Rising, Ill.	D.	223.752	734.093
Do.	Sanitary B. M.	183.036	600.511	Near Champaign, Ill.	E.	228.090	748.325
Do.	P. B. M. 123.	186.314	611.265	Champaign, Ill.	F.	219.792	721.101
Do.	Top of cap over same	187.518	615.215	Do.	G.	220.302	722.774
Do.	Chicago West Base.	187.858	616.331	Olney, Ill.	A.	147.415	483.644
Summit, Ill.	T. B. M. 466.	180.555	592.371	Near Olney, Ill.	B.	141.893	465.527
Do.	P. B. M. 124.	182.765	599.621	Do.	C.	144.874	475.307
Do.	Sanitary B. M.	182.769	599.635	Near Dundas, Ill.	D.	146.698	481.292
Near Summit, Ill.	T. B. M. 468.	181.550	595.635	Near West Liberty, Ill.	E.	146.686	481.252
Do.	P. B. M. 125.	181.390	595.110	Do.	F.	154.573	507.128
Do.	P. B. M. 126.	183.187	601.036	Near Boos, Ill.	G.	160.086	525.215
Do.	Top of cap over same	184.394	604.966	Near Newton, Ill.	H.	156.359	512.988
Near Chicago, Ill.	S. D. 22.	181.019	593.893	Do.	I.	164.228	538.805
Do.	T. B. M. 470.	180.643	592.690	Near Falmouth, Ill.	J.	172.176	564.881
Do.	T. B. M. 471.	180.703	592.856	Rosehill, Ill.	K.	172.710	566.633
Chicago, Ill.	T. B. M. 472.	180.025	590.632	Near Hidalgo, Ill.	L.	177.478	582.276
Do.	P. B. M. 127.	183.317	601.433	Do.	M.	180.942	593.641
Do.	S. D. 24.	180.606	592.538	Greenup, Ill.	N.	165.717	543.690
Do.	S. D. 18.	182.534	598.864	Near Greenup, Ill.	O.	168.673	553.388
Do.	P. B. M. 128.	180.909	593.532	Near Toledo, Ill.	P.	183.753	602.863
Do.	Top of cap over same	182.118	597.499	Near Bradbury, Ill.	Q.	185.359	608.132
Do.	T. B. M. 474.	180.597	592.509	Do.	R.	206.223	676.583
Do.	P. B. M. 129.	182.626	599.165	Near Janesville, Ill.	S.	224.314	735.937
Do.	Sanitary B. M.	183.097	600.711	Lerna, Ill.	T.	229.916	754.316
Do.	S. D. 16.	182.982	600.333	Near Lerna, Ill.	U.	215.978	708.588
Do.	S. D. 15.	182.206	597.788	Do.	V.	187.620	615.550
Do.	S. D. 14.	181.746	596.778	Charleston, Ill.	W.	205.071	672.804
Do.	T. B. M. 475.	181.899	596.780	Do.	X.	209.257	686.537
Do.	P. B. M. 130.	182.999	600.339	Near Charleston, Ill.	Y.	209.357	686.865
Do.	Sanitary B. M.	183.908	603.371	Near Fairgrange, Ill.	Z.	209.423	687.082
Do.	P. B. M. 131.	181.570	595.701	Near Bushon, Ill.	A.	203.176	666.587
Do.	South Sanitary B. M.	183.844	603.162	Near Rardin, Ill.	B.	200.665	658.348
Do.	North Sanitary B. M.	183.835	603.132	Near Oakland, Ill.	C.	199.042	653.024
Do.	T. B. M. 476.	179.877	590.146	Do.	D.	201.654	661.593
Do.	T. B. M. 477.	180.861	593.375	Do.	E.	201.834	662.184
Do.	T. B. M. 478.	180.886	593.457	Near Brockton, Ill.	F.	206.856	678.660
Do.	P. B. M. 132.	182.029	597.207	Do.	G.	200.030	656.265
Do.	P. B. M. 133.	181.616	595.852	Near Hume, Ill.	H.	196.992	646.298
Do.	P. B. M. 134.	181.496	595.458	Do.	I.	211.401	693.571
Do.	West Sanitary B. M.	183.003	600.402	Near Hildreth, Ill.	J.	210.917	691.984
Do.	East Sanitary B. M.	182.991	600.363	Sidell, Ill.	K.	208.845	685.186
Do.	T. B. M. 479.	181.728	596.219	Near Sidell, Ill.	L.	207.222	679.861
Do.	S. D. 9.	180.657	592.706	Jamaica, Ill.	M.	206.628	677.912
Do.	T. B. M. 480.	179.041	587.404	Near Jamaica, Ill.	N.	203.715	668.355
Do.	P. B. M. 135.	179.459	588.775	Near Fairmount Jet., Ill.	O.	199.499	654.523
Do.	S. D. 7.	180.375	591.780	Do.	P.	204.942	672.381
Do.	S. D. 6.	180.353	591.708	Near Catlin, Ill.	Q.	200.375	657.397
Do.	S. D. 2.	178.304	584.986	Near Fairmount, Ill.	R.	199.906	658.855
Do.	S. D. 1.	179.641	589.372	Do.	S.	202.507	661.392
Do.	T. B. M. 481.	179.952	590.393				
Do.	T. B. M. 482.	180.394	591.843				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Homer, Ill.	T.	205.583	674.484	Near Dennison, Ohio.	P. R. R.	261.826	858.007
Do.	U.	203.615	668.027	Station 15 P. O., Ohio.	868 Steubenville.	264.756	868.620
Sidney, Ill.	V.	203.001	672.574				
Deers, Ill.	W.	210.908	691.954	Washington, D. C.	B. & O. No. 1.	12.877	41.995
Mira, Ill.	X.	212.167	696.085	Do.	B. & O. No. 2.	17.768	58.294
Near Urbana, Ill.	Y.	214.775	704.641	Near Winthrop Heights, D. C.	B. & O. No. 3.	20.622	67.789
Near Renick, Ohio.	A.	187.964	616.679	Langdon, D. C.	B. & O. No. 4.	20.858	68.422
Near Locks, Ohio.	B.	185.938	610.032	Rives, Md.	B. & O. No. 5.	18.207	59.734
Do.	C.	179.592	589.211	Near Hyattsville, Md.	B. & O. No. 6.	10.578	34.705
Near Higby, Ohio.	D.	179.446	588.732	Alexandria Junction, Md.	B. & O. No. 7.	14.999	49.209
Omega, Ohio.	E.	181.550	595.635	Riverdale, Md.	B. & O. No. 8.	15.844	51.982
Near Omega, Ohio.	F.	174.052	571.036	Near Riverdale, Md.	B. & O. No. 9.	16.217	53.205
Near Waverly, Ohio.	G.	173.683	569.825	Near College Park, Md.	B. & O. No. 10.	16.142	52.959
Near Glen Jean, Ohio.	H.	171.246	561.830	Near Berwyn, Md.	B. & O. No. 9A.	16.166	53.038
Piketon, Ohio.	I.	176.253	578.257	Near Branchville, Md.	B. & O. No. 10.	20.019	65.679
Near Sargents, Ohio.	J.	176.680	579.658	Do.	B. & O. No. 11.	23.636	77.546
Near Wakefield, Ohio.	K.	167.924	550.931	Near Sunnyside, Md.	B. & O. No. 12.	30.886	101.332
Clifford, Ohio.	L.	169.493	556.078	Near Beltsville, Md.	B. & O. No. 13.	38.333	125.456
Near Lucasville, Ohio.	M.	168.880	554.067	Near Ammendale, Md.	B. & O. No. 14.	42.013	137.838
Near Davis, Ohio.	N.	170.310	558.759	Near Muirkirk, Md.	B. & O. No. 14A.	46.523	152.634
Do.	O.	170.039	557.700	Do.	B. & O. No. 15.	48.057	157.667
Near Vera, Ohio.	P.	162.680	533.726	Near Contee, Md.	B. & O. No. 16.	54.642	179.271
Portsmouth, Ohio.	U. S. E.	163.108	535.130	Do.	B. & O. No. 17.	53.021	175.922
				Near Oak Crest, Md.	B. & O. No. 17A.	51.720	169.685
Chillicothe, Ohio.	A.	196.046	643.194	Near Laurel, Md.	B. & O. No. 18.	47.280	155.118
Near Chillicothe, Ohio.	C.	189.070	620.307	Laurel, Md.	B. & O. No. 19.	45.481	149.216
Delano, Ohio.	D.	210.542	690.753	Near Savage Station, Md.	B. & O. No. 20.	52.669	172.897
Do.	E.	211.517	693.952	Do.	B. & O. No. 21.	47.031	154.301
Kingston, Ohio.	F.	235.936	774.067	Near Annapolis Jet., Md.	B. & O. No. 22.	51.200	174.540
Near Kingston, Ohio.	G.	227.598	746.711	Near Bridgewell, Md.	B. & O. No. 23.	51.924	170.354
Near Haysville, Ohio.	H.	217.523	713.657	Do.	B. & O. No. 24.	51.411	168.671
Near Circleville, Ohio.	I.	215.352	706.534	Near Jessups, Md.	B. & O. No. 25.	48.255	158.317
Do.	J.	210.372	690.195	Near Montevideo, Md.	B. & O. No. 26.	41.799	137.136
Circleville, Ohio.	K.	211.400	693.568	Near Dorsey, Md.	B. & O. No. 27.	53.882	176.778
Near Circleville, Ohio.	L.	211.239	693.040	Near Harwood, Md.	B. & O. No. 28.	26.888	88.215
Near Cromley, Ohio.	M.	216.293	709.621	Near Hanover, Md.	B. & O. No. 29.	24.644	80.853
Duvals, Ohio.	N.	217.048	712.098	Near Elk Ridge, Md.	B. & O. No. 30.	21.673	71.106
Near Duvals, Ohio.	O.	218.200	715.878	Relay, Md.	B. & O. No. 31.	21.859	71.716
Lockbourne, Ohio.	P.	218.121	715.619	Near St. Denis, Md.	B. & O. No. 31A.	20.632	67.690
Near Rees, Ohio.	Q.	220.330	722.866	Do.	B. & O. No. 32.	22.823	73.894
Near Valley Crossing, Ohio.	R.	229.190	751.934	Near Haleshorpe, Md.	B. & O. No. 33.	20.665	67.798
Columbus, Ohio.	T.	237.013	777.600	Near Lansdowne, Md.	P. R. R. No. 101.	11.206	36.765
Do.	S=City.	237.866	780.399	Lansdowne, Md.	B. & O. No. 34.	21.010	68.900
Near Bannan, Ohio.	A.	229.357	752.482	Near Lansdowne, Md.	B. & O. No. 35.	24.113	79.111
Near Truro, Ohio.	T. B. M. 6.	233.891	767.357	West Baltimore, Md.	B. & O. No. 36.	22.053	72.352
Near Brice, Ohio.	T. B. M. 9.	243.157	797.758	Baltimore, Md.	B. & O. No. 39.	2.784	9.134
Near Harley, Ohio.	C.	263.664	865.038	Do.	City 1288.	38.728	127.060
Basil, Ohio.	D.	264.393	867.429	Do.	B. & O. No. 41.	21.603	70.876
Thurston, Ohio.	E.	270.169	886.379	Do.	B. & O. No. 42.	28.592	93.707
Near Thurston, Ohio.	F.	285.040	935.169	Do.	B. & O. No. 43.	45.528	149.370
Near New Salem, Ohio.	G.	290.100	951.770	Do.	City 1240.	43.402	142.395
Thornport, Ohio.	H.	274.289	899.896				
Near Thornport, Ohio.	I.	268.244	880.064	Baltimore, Md.	Tidal 2.	1.410	4.626
Glenford, Ohio.	J.	258.809	849.109	Do.	Tidal 1.	1.354	4.442
Do.	844 Glenford.	257.422	844.559	Do.	Tidal 3.	2.773	9.098
Near Glassrock, Ohio.	K.	251.735	825.901	Do.	Tidal 4.	8.393	27.536
Mount Perry, Ohio.	L.	244.298	801.501	Do.	City 1181.	9.334	30.623
Near Mount Perry, Ohio.	M.	243.105	797.587	Do.	L.	21.312	69.921
Near Fultonham, Ohio.	N.	232.543	762.935	Do.	M.	2.741	8.968
Near White Cottage, Ohio.	O.	218.523	716.938	Do.	B. & O. No. 40.	7.663	25.141
Near South Zanesville, Ohio.	P.	216.279	709.575	Mount Winans, Md.	B. & O. No. 38.	6.593	21.631
Zanesville, Ohio.	Q.	221.200	725.720	Do.	B. & O. No. 37.	11.206	36.765
Do.	725 Zanesville.	221.193	725.697				
Do.	U. S. E. 2.	213.147	699.300	Near Relay, Md.	B. & O. No. 100.	20.809	68.260
Do.	U. S. E. 1.	213.091	699.116	Vineyard, Md.	B. & O. No. 101.	21.632	70.971
Near Zanesville, Ohio.	R.	237.296	778.529	Near Vineyard, Md.	B. & O. No. 102.	23.487	77.057
Sonora, Ohio.	S.	246.451	808.643	Near Orange Grove, Md.	B. & O. No. 103.	28.952	94.987
Near Sonora, Ohio.	T.	237.326	778.027	Ilchester, Md.	B. & O. No. 104.	33.276	109.173
Do.	U.	234.758	770.202	Gray, Md.	B. & O. No. 105.	37.029	121.486
Sundale, Ohio.	V.	270.085	886.104	Ellicott City, Md.	B. & O. No. 106.	44.006	144.376
New Concord, Ohio.	W.	257.040	843.305	Oella, Md.	B. & O. No. 106A.	45.121	148.034
Near New Concord, Ohio.	X.	248.399	814.956	Near Oella, Md.	B. & O. No. 107.	51.340	168.438
Cassells, Ohio.	Y.	245.119	804.195	Near Hollofield, Md.	B. & O. No. 108.	57.160	187.532
Near Cassells, Ohio.	Z.	245.215	804.510	Do.	U. S. G. S.	57.183	187.608
Cambridge, Ohio.	A'.	270.031	885.927	Do.	B. & O. No. 109.	58.712	192.624
Near Cambridge, Ohio.	B'.	245.235	804.575	Hollofield, Md.	B. & O. No. 110.	60.180	199.996
Do.	C'.	238.920	783.857	Near Hollofield, Md.	B. & O. No. 111.	65.749	215.712
Do.	D'.	238.065	787.285	Alberton, Md.	B. & O. No. 112.	67.773	222.352
Kimbolton, Ohio.	E'.	239.968	787.295	Near Alberton, Md.	B. & O. No. 113.	72.254	237.053
Birds Run, Ohio.	G'.	234.982	770.937	Do.	B. & O. No. 114.	74.623	244.826
Guernsey, Ohio.	H'.	237.975	780.756	Near Davis, Md.	B. & O. No. 115.	76.019	249.406
Near Guernsey, Ohio.	I'.	252.547	828.565	Davis, Md.	B. & O. No. 116.	78.870	258.750
Newcomerstown, Ohio.	J'.	245.479	805.376	Near Woodstock, Md.	B. & O. No. 117.	82.773	271.564
Near Newcomerstown, Ohio.	K'.	245.339	804.916	Do.	B. & O. No. 118.	87.850	288.221
Near Port Washington, Ohio.	P. R. R.	249.351	818.079	Near Marriottsville, Md.	B. & O. No. 119.	88.880	291.600
Do.	L'.	249.346	818.063	Marriottsville, Md.	B. & O. No. 120.	89.258	292.841
Seventeen, Ohio.	M'.	254.533	835.080	Near Henryton, Md.	B. & O. No. 121.	91.184	299.160
Snadenhutton, Ohio.	N'.	254.440	834.775	Near Gorsuch, Md.	B. & O. No. 122.	94.776	310.944
Near Tuscarawas, Ohio.	O'.	257.549	844.975	Gorsuch, Md.	B. & O. No. 123.	98.645	323.638
Uhrichsville, Ohio.	B. & O. No. 48.	262.822	862.275	Near Sykesville, Md.	B. & O. No. 124.	107.007	351.072
Near Uhrichsville, Ohio.	P'.	262.553	861.498	Sykesville, Md.	B. & O. No. 125.	114.588	375.944
				Near Gaiter, Md.	B. & O. No. 126.	124.596	408.779
				Do.	B. & O. No. 127.	127.783	419.235

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Hoods Mills, Md.	B. & O. No. 128.	130.484	428.096	Near Sipes, Pa.	B. & O. No. 224.	384.214	1260.542
Hoods Mills, Md.	B. & O. No. 129.	134.672	441.836	Near Oniophyle, Pa.	B. & O. No. 225.	375.290	1231.231
Near Morgan, Md.	B. & O. No. 130.	140.434	460.741	Do.	B. & O. No. 226.	368.474	1208.902
Near Woodbine, Md.	B. & O. No. 131.	148.124	485.970	Near Bear Run, Pa.	B. & O. No. 227.	358.886	1177.445
Woodbine, Md.	B. & O. No. 131A.	151.142	495.872	Bear Run, Pa.	B. & O. No. 228.	351.150	1152.065
Near Woodbine, Md.	B. & O. No. 132.	156.586	513.733	Near Bear Run, Pa.	B. & O. No. 229.	342.404	1123.370
Near Watersville, Md.	B. & O. No. 133.	167.796	550.511	Near Stewarton, Pa.	B. & O. No. 230.	333.974	1095.713
Do.	B. & O. No. 134.	180.905	593.519	Do.	B. & O. No. 231.	327.275	1073.735
Do.	B. & O. No. 135.	189.604	622.059	Do.	B. & O. No. 232.	318.647	1045.428
Do.	B. & O. No. 136.	214.336	703.201	Near Indian Creek, Pa.	B. & O. No. 233.	310.068	1017.281
Do.	B. & O. No. 136A.	207.242	679.926	Indian Creek, Pa.	B. & O. No. 234.	295.371	969.985
Near Plane No. 4, Md.	B. & O. No. 137.	200.356	657.335	Do.	U. S. G. S.	295.655	969.985
Do.	B. & O. No. 138.	177.185	581.314	Near Indian Creek, Pa.	B. & O. No. 235.	289.915	951.163
Near Bartholows, Md.	B. & O. No. 139.	167.686	550.150	Do.	B. & O. No. 236.	286.630	940.451
Bartholows, Md.	B. & O. No. 140.	161.058	528.404	Do.	B. & O. No. 237.	285.843	937.803
Near Monrovia, Md.	B. & O. No. 141.	149.198	489.494	Do.	B. & O. No. 238.	280.090	918.929
Do.	B. & O. No. 142.	144.324	473.503	Near South Connellsville, Pa.	B. & O. No. 239.	277.457	910.389
Monrovia, Md.	B. & O. No. 143.	130.227	427.253	Do.	B. & O. No. 240.	269.552	884.355
Near Monrovia, Md.	B. & O. No. 144.	119.184	391.223	Near Connellsville, Pa.	B. & O. No. 240A.	269.599	884.509
Do.	B. & O. No. 145.	114.954	377.145	Do.	U. S. G. S.	269.599	884.509
Near Iiamsville, Md.	B. & O. No. 146.	109.764	360.117	Near Connellsville, Pa.	B. & O. No. 241.	267.140	876.442
Do.	B. & O. No. 147.	107.267	351.925	Do.	B. & O. No. 242.	266.273	873.597
Do.	B. & O. No. 148.	100.450	329.560	Near Broad Ford Junction, Pa.	B. & O. No. 243.	263.776	865.405
Do.	B. & O. No. 149.	96.026	315.045	Do.	B. & O. No. 244.	261.300	857.282
Near Reels Mill, Md.	B. & O. No. 150.	88.943	291.807	Broad Ford, Pa.	B. & O. No. 245.	260.527	854.746
Reels Mill, Md.	B. & O. No. 151.	83.534	274.061	Near Broad Ford, Pa.	B. & O. No. 246.	260.432	854.434
Frederick Junction, Md.	B. & O. No. 152.	81.122	266.148	Do.	B. & O. No. 246A.	259.187	850.349
Near Frederick Jct., Md.	B. & O. No. 152A.	86.853	284.950	Near Dawson, Pa.	B. & O. No. 247.	258.261	847.311
Near Frederick, Md.	B. & O. No. 152B.	92.226	302.578	Do.	B. & O. No. 248.	254.964	836.494
Frederick, Md.	B. & O. No. 152C.	88.177	289.294	Do.	B. & O. No. 249.	255.829	839.332
Near Frederick Jct., Md.	B. & O. No. 153.	76.881	252.234	Near Lavenia, Pa.	B. & O. No. 250.	254.424	834.723
Do.	B. & O. No. 153A.	76.579	251.243	Do.	B. & O. No. 251.	254.060	833.529
Near Lime Kiln, Md.	B. & O. No. 154.	82.874	271.896	Near Layton, Pa.	B. & O. No. 252.	246.629	809.149
Do.	B. & O. No. 155.	86.453	283.638	Layton, Pa.	B. & O. No. 253.	245.519	805.507
Near Buckeystown Station, Md.	B. & O. No. 156.	84.590	277.526	Near Layton, Pa.	B. & O. No. 254.	244.503	802.174
Buckeystown Station, Md.	B. & O. No. 156A.	86.003	282.162	Do.	B. & O. No. 255.	241.502	792.328
Near Buckeystown, Md.	B. & O. No. 157.	91.180	299.146	Near Banning, Pa.	B. & O. No. 256.	240.811	790.061
Near Adamstown, Md.	B. & O. No. 158.	94.588	310.327	Near Jacobs Creek, Pa.	B. & O. No. 257.	238.765	783.348
Near Doubts, Md.	B. & O. No. 159.	87.027	285.521	Near Eureka, Pa.	B. & O. No. 258.	237.006	777.577
Do.	B. & O. No. 160.	88.510	290.387	Smithton, Pa.	B. & O. No. 259.	236.409	775.619
Near Washington Jct., Md.	B. & O. No. 161.	87.379	286.676	Near Fort Royal, Pa.	B. & O. No. 260.	236.942	777.367
Do.	B. & O. No. 162.	78.500	257.545	Do.	B. & O. No. 261.	235.925	774.031
Washington Junction, Md.	B. & O. No. 44.	71.898	235.885	Near Reduction, Pa.	B. & O. No. 262.	235.881	773.886
Near Adamstown, Md.	B. & O. No. 163.	86.853	284.950	Do.	B. & O. No. 263.	234.824	770.418
Near Doubts, Md.	B. & O. No. 164.	82.490	270.636	Griffin, Pa.	B. & O. No. 264.	233.780	766.993
Near Washington Jct., Md.	B. & O. No. 165.	76.832	252.073	Near West Newton, Pa.	B. & O. No. 265.	234.302	768.706
Glencoe, Pa.	B. & O. No. 177.	458.306	1605.331	West Newton, Pa.	B. & O. No. 266.	233.797	767.049
Near Glencoe, Pa.	B. & O. No. 178.	502.214	1647.680	Near West Newton, Pa.	B. & O. No. 266A.	232.877	764.031
Do.	B. & O. No. 179.	514.706	1688.665	Do.	B. & O. No. 267.	233.234	765.202
Philson, Pa.	B. & O. No. 180.	546.044	1791.479	Near Gratztown, Pa.	B. & O. No. 268.	231.648	759.998
Near Philson, Pa.	B. & O. No. 181.	574.370	1884.412	Do.	B. & O. No. 269.	233.252	765.261
Do.	B. & O. No. 182.	605.688	1987.165	Suter, Pa.	B. & O. No. 270.	232.066	761.370
Near Mance, Pa.	B. & O. No. 182A.	610.377	2002.545	Near Scott Haven, Pa.	B. & O. No. 271.	233.088	764.723
Do.	B. & O. No. 183.	628.761	2062.860	Vista, Pa.	B. & O. No. 272.	232.870	764.008
Do.	B. & O. No. 184.	641.072	2103.550	Shaner, Pa.	B. & O. No. 273.	231.284	758.804
Near Sand Patch, Pa.	B. & O. No. 185.	676.448	2219.313	Guley, Pa.	B. & O. No. 274.	229.616	753.332
Sand Patch, Pa.	B. & O. No. 186.	693.100	2273.946	Near Coulter, Pa.	B. & O. No. 275.	229.697	753.598
Keystone, Pa.	B. & O. No. 187.	687.279	2254.848	Do.	B. & O. No. 276.	229.404	752.636
Near Myersdale, Pa.	B. & O. No. 188.	660.884	2168.550	Do.	B. & O. No. 277.	229.377	752.548
Myersdale, Pa.	B. & O. No. 189.	642.193	2106.924	Do.	B. & O. No. 278.	229.390	752.590
Near Salisbury Jct., Pa.	B. & O. No. 190.	625.958	2053.668	Near Versailles, Pa.	B. & O. No. 279.	229.717	753.663
Do.	B. & O. No. 191.	608.123	1995.150	Do.	B. & O. No. 280.	228.474	749.585
Do.	B. & O. No. 192.	592.429	1943.661	Versailles, Pa.	B. & O. No. 281.	227.966	747.918
Near Garrett, Pa.	B. & O. No. 193.	590.575	1937.578	Near Christy Park, Pa.	B. & O. No. 282.	228.602	750.005
Do.	B. & O. No. 194.	588.502	1930.777	Near McKeesport, Pa.	B. & O. No. 283.	228.575	749.916
Do.	B. & O. No. 195.	587.868	1928.697	McKeesport, Pa.	B. & O. No. 284.	228.890	750.590
Do.	B. & O. No. 196.	583.329	1912.821	Do.	B. & O. No. 285.	228.620	750.064
Do.	B. & O. No. 197.	577.024	1893.120	Demmler, Pa.	B. & O. No. 286.	228.745	750.474
McSpadden, Pa.	B. & O. No. 198.	569.381	1868.044	Near Bessemer, Pa.	B. & O. No. 287.	229.304	752.308
Near McSpadden, Pa.	B. & O. No. 199.	566.407	1858.287	Do.	B. & O. No. 287A.	227.552	746.560
Near Rockwood, Pa.	B. & O. No. 200.	562.552	1845.639	Bessemer, Pa.	B. & O. No. 288.	229.320	752.361
Do.	B. & O. No. 201.	556.884	1827.044	Near Braddock, Pa.	B. & O. No. 289.	228.300	749.014
Rockwood, Pa.	B. & O. No. 202.	551.749	1810.196	Rankin, Pa.	B. & O. No. 290.	229.979	754.523
Near Rockwood, Pa.	B. & O. No. 203.	547.541	1796.391	Near Rankin, Pa.	B. & O. No. 291.	229.180	751.901
Do.	B. & O. No. 204.	542.847	1780.991	Near Highland, Pa.	B. & O. No. 292.	228.679	750.258
Near Casselman, Pa.	B. & O. No. 205.	537.506	1763.468	Highland, Pa.	B. & O. No. 292A.	225.698	740.478
Casselman, Pa.	B. & O. No. 206.	529.261	1736.417	Wheeling Junction, Pa.	B. & O. No. 293.	231.914	760.871
Near Casselman, Pa.	B. & O. No. 207.	523.052	1716.046	Near Glenwood, Pa.	B. & O. No. 294.	234.740	770.143
Near Markleton, Pa.	B. & O. No. 208.	516.933	1695.971	Marion Junction, Pa.	B. & O. No. 295.	233.410	765.779
Markleton, Pa.	B. & O. No. 209.	511.013	1676.548	Laughlin Junction, Pa.	B. & O. No. 296.	230.128	755.012
Pinkerton, Pa.	B. & O. No. 210.	499.942	1640.226	Pittsburgh, Pa.	B. & O. No. 297.	227.396	746.405
Near Pinkerton, Pa.	B. & O. No. 211.	490.182	1608.205	Do.	B. & O. No. 298.	228.380	749.277
Fort Hill, Pa.	B. & O. No. 212.	482.012	1581.401	Do.	B. & O. No. 299.	226.647	743.591
Near Fort Hill, Pa.	B. & O. No. 213.	472.193	1549.187	Do.	B. & O. No. 300.	227.722	747.118
Do.	B. & O. No. 214.	457.908	1502.320	Near Laughlin Jct., Pa.	B. & O. No. 301.	234.007	767.738
Near Ursina, Pa.	B. & O. No. 215.	442.257	1450.971	Do.	B. & O. No. 302.	249.132	817.361
Near Confluence, Pa.	B. & O. No. 216.	425.627	1396.411	Do.	B. & O. No. 303.	896.428	841.298
Confluence, Pa.	B. & O. No. 217.	405.991	1331.989	Do.	B. & O. No. 304.	250.737	822.626
Near Confluence, Pa.	B. & O. No. 218.	402.867	1321.739	Do.	B. & O. No. 305.	243.973	800.435
Do.	B. & O. No. 219.	396.201	1299.869	Pittsburgh, Pa.	B. & O. No. 306.	229.841	754.070
Near Bidwell, Pa.	B. & O. No. 220.	394.880	1295.535	Lawrenceville, Pa.	P. R. R. No. 96.	239.001	784.122
Bidwell, Pa.	B. & O. No. 221.	391.878	1285.686	Pittsburgh, Pa.	B. & O. No. 306A.	227.112	745.117
Near Bidwell, Pa.	B. & O. No. 222.	392.596	1285.686	Near Pittsburgh, Pa.	B. & O. No. 307.	226.631	743.539
Near Sipes, Pa.	B. & O. No. 223.	393.644	1291.480				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Allegheny, Pa.	B. & O. No. 308A	223.415	732.987	Near Edenburg, Pa.	B. & O. No. 368	244.065	800.737
Do.	B. & O. No. 308B	220.121	722.180	Do.	B. & O. No. 369	245.136	807.597
Do.	B. & O. No. 308C	218.701	717.522	Near Lowellville, Ohio.	B. & O. No. 370	245.418	808.460
Do.	B. & O. No. 308D	221.106	725.412	Do.	B. & O. No. 371	246.690	809.349
Near Sharpsburg, Pa.	B. & O. No. 310=P.	223.428	733.033	Lowellville, Ohio.	B. & O. No. 372	250.167	820.756
Do.	R. R. No. 5.			Near Lowellville, Ohio.	B. & O. No. 373	254.175	833.906
Do.	B. & O. No. 310A	221.551	726.872	Near Struthers, Ohio.	B. & O. No. 374	255.874	839.480
Sharpsburg, Pa.	B. & O. No. 311	222.657	730.501	Do.	B. & O. No. 375	252.791	829.365
Near Sharpsburg, Pa.	B. & O. No. 311A	223.294	738.857				
Do.	B. & O. No. 312	230.840	757.348	Near Alliance, Ohio.	Br. 66.	334.071	1096.031
Witmer, Pa.	B. & O. No. 313	236.378	775.517	Alliance, Ohio.	Q.	336.192	1102.999
Glenshaw, Pa.	B. & O. No. 314	240.521	789.109	Do.	City.	336.843	1108.128
Mount Royal, Pa.	B. & O. No. 314A	248.228	814.395	Do.	R.	341.136	1119.210
Ellinwood, Pa.	B. & O. No. 315	253.971	833.237	Do.	Lunch room	331.484	1087.491
Allison Park, Pa.	B. & O. No. 316	256.513	841.576	Near Alliance, Ohio.	Br. 65 (1906)	321.567	1055.008
Near Allison Park, Pa.	B. & O. No. 316A	260.025	854.199	Do.	Br. 64 (1906)	323.829	1062.429
Do.	B. & O. No. 317	265.907	872.397	Near Sebring, Ohio.	West Culvert	338.277	1108.830
Near Bryant, Pa.	B. & O. No. 318	272.130	892.813	Do.	East Culvert	337.122	1106.041
Do.	B. & O. No. 318A	275.086	902.511	Near Snodens, Ohio.	S.	332.371	1090.454
Wildwood, Pa.	B. & O. No. 319	278.945	915.172	Near Berlin Center, Ohio.	T.	331.955	1089.089
Near Wildwood, Pa.	B. & O. No. 319A	283.474	930.031	Do.	U.	330.668	1084.866
Do.	B. & O. No. 320	292.304	959.007	Berlin Center, Ohio.	V.	337.156	1106.153
Do.	B. & O. No. 321	305.838	1003.403	Ellsworth, Ohio.	W.	341.580	1120.687
Near Gibsonia, Pa.	B. & O. No. 322	325.500	1067.911	Rosemont, Ohio.	X.	331.680	1071.455
Do.	U. S. G. S.	314.167	1030.730	Do.	Y.	329.453	1080.877
Near Bakerstown, Pa.	B. & O. No. 323	350.550	1150.096	Do.	Z.	324.782	1065.556
Do.	B. & O. No. 324	358.415	1175.900	North Jackson, Ohio.	A.	309.267	1014.653
Near Valencia, Pa.	B. & O. No. 325	336.486	1103.954	Do.	B.	312.306	1024.624
Near Downieville, Pa.	B. & O. No. 326	321.026	1053.233	Near North Jackson, Ohio.	C.	305.246	1001.461
Do.	B. & O. No. 326A	315.764	1035.969	Lordstown, Ohio.	D.	302.259	999.011
Mars, Pa.	B. & O. No. 327	312.580	1025.523	Near Lordstown, Ohio.	E.	280.369	919.844
Near Mars, Pa.	B. & O. No. 328	305.929	1003.702	Near Boenna Crossing, Ohio.	F.	274.120	899.342
Do.	B. & O. No. 329	301.280	988.449				
Near Callery Junction, Pa.	B. & O. No. 330	298.223	978.420	Near Niles, Ohio.	G.	268.034	879.375
Callery Junction, Pa.	B. & O. No. 330A	296.334	972.222	Near Girard, Ohio.	H.	258.151	879.759
Near Callery Junction, Pa.	B. & O. No. 331	295.705	970.159	Near Youngstown, Ohio.	I.	269.401	883.860
Near Evans City, Pa.	B. & O. No. 332	290.850	954.230	Do.	J.	263.748	865.313
Evans City, Pa.	B. & O. No. 333	286.503	938.328	Do.	B. & O. No. 381	256.671	842.002
Near Evans City, Pa.	B. & O. No. 334	283.109	929.490	Youngstown, Ohio.	B. & O. No. 380	257.162	843.706
Do.	B. & O. No. 335	281.599	923.879	Do.	R. R.	258.202	847.118
Do.	B. & O. No. 335A	278.490	913.679	Hazleton, Ohio.	837 ADJ.	254.651	836.452
Near Harmony Junction, Pa.	B. & O. No. 336	279.101	915.684	Near Struthers, Ohio.	B. & O. No. 377	255.207	847.134
Do.	B. & O. No. 337	278.235	912.843	Struthers, Ohio.	B. & O. No. 376	257.485	844.765
Near Harmony, Pa.	B. & O. No. 338	278.997	915.343				
Near Zelenople, Pa.	B. & O. No. 339	277.024	908.870	Akron, Ohio.	B. & O. No. 441	307.601	1009.188
Do.	B. & O. No. 340	273.520	897.374	Do.	B. & O. No. 442	302.945	993.912
Old Furnace, Pa.	B. & O. No. 341	274.274	899.847	Near Akron, Ohio.	B. & O. No. 443	297.771	976.937
Near Old Furnace, Pa.	B. & O. No. 341A	271.611	891.110	Barberton, Ohio.	B. & O. No. 444=P.	295.080	968.108
Near Fombell, Pa.	B. & O. No. 342	269.848	885.326		R. R.		
Fombell, Pa.	B. & O. No. 343	267.616	878.003	Near Barberton, Ohio.	B. & O. No. 445	294.294	965.234
Goehring, Pa.	B. & O. No. 344	266.423	874.089	Do.	B. & O. No. 446	296.118	971.514
Celia, Pa.	B. & O. No. 345	265.672	871.626	Near Turkeyfoot Junction, Ohio.	B. & O. No. 447	295.207	968.325
Near Hazen, Pa.	B. & O. No. 346	264.239	866.924				
Near McKimms, Pa.	B. & O. No. 347	264.362	867.328	Messenger, Ohio.	P. R. R.	292.739	960.428
Do.	B. & O. No. 348	264.185	866.747	Near Clinton, Ohio.	B. & O. No. 448	288.248	945.087
Near Sewickley, Pa.	B. & O. No. 348A	267.721	878.348	Near Warwick, Ohio.	B. & O. No. 449	292.100	958.331
				Do.	B. & O. No. 450	292.188	958.030
Near Ellwood City, Pa.	B. & O. No. 349	271.400	890.418	Do.	B. & O. No. 451	288.762	947.380
Ellwood City, Pa.	B. & O. No. 349A	274.582	900.858	Near Easton, Ohio.	B. & O. No. 452	288.954	948.010
Near Ellwood City, Pa.	B. & O. No. 350	267.121	876.379	Do.	B. & O. No. 453	290.879	954.326
Near West Ellwood Jct., Pa.	A.	237.739	779.982	Do.	B. & O. No. 454	292.301	958.991
Homewood, Pa.	Br. 38 (1906)	290.140	951.901	Easton, Ohio.	B. & O. No. 455	292.803	960.185
Near Homewood, Pa.	Br. 39 (1906)	291.975	957.921	Near Easton, Ohio.	B. & O. No. 456	291.211	953.415
Summit, Pa.	Br. 40	319.418	1047.957	Near Rittman, Ohio.	B. & O. No. 457	291.726	957.104
Mayfield, Pa.	Br. 34	261.775	858.840	Do.	B. & O. No. 458	293.173	961.852
Geneva, Pa.	Geneva Depot (1906)	252.618	828.798	Do.	B. & O. No. 459	295.417	969.214
Beaver Falls, Pa.	B. F. Depot (1906)	241.560	789.237	Near Sterling, Ohio.	B. & O. No. 460	293.627	969.903
Kenwood, Pa.	Br. 29	228.410	749.375	Do.	B. & O. No. 460A=	293.730	963.679
New Brighton, Pa.	New Brighton Depot	229.380	752.558	Do.	U. S. G. S.		
Near New Brighton, Pa.	Br. 27	223.795	734.234	Do.	B. & O. No. 461	295.798	970.404
Do.	Br. 26	217.147	712.423	Do.	B. & O. No. 462	297.187	975.021
Monaca, Pa.	25A	229.739	753.735	Do.	B. & O. No. 463	299.480	982.544
Do.	25C	209.228	686.442	Near Creston, Ohio.	B. & O. No. 464	300.937	987.324
				Do.	B. & O. No. 465	296.949	974.240
Near Rock Point, Pa.	B. & O. No. 351	265.949	872.534	Do.	B. & O. No. 466	295.190	960.968
Do.	B. & O. No. 352	262.198	860.225	Near Lodi, Ohio.	B. & O. No. 467	294.688	966.757
Chewton, Pa.	B. & O. No. 353	258.437	847.889	Do.	B. & O. No. 468	295.730	970.241
Near Chewton, Pa.	B. & O. No. 354	249.561	818.708	Do.	B. & O. No. 469	293.226	952.183
Do.	B. & O. No. 355	245.240	804.592	Lodi, Ohio.	B. & O. No. 470	284.940	901.888
West Pittsburgh, Pa.	B. & O. No. 356	245.348	804.946	Near Lodi, Ohio.	B. & O. No. 471	278.524	913.791
Near West Pittsburgh, Pa.	B. & O. No. 357	243.892	800.169	Do.	B. & O. No. 472	278.525	913.794
Near New Castle Jct., Pa.	B. & O. No. 359	241.763	793.184	Do.	B. & O. No. 473	278.699	914.365
Do.	B. & O. No. 359A	243.062	797.446	Do.	B. & O. No. 474	287.586	943.522
Mahoningtown, Pa.	U. S. G. S.	239.429	785.527	Near Homer, Ohio.	B. & O. No. 475	302.124	991.218
Near Mahoningtown, Pa.	B. & O. No. 360	240.737	789.818	Do.	B. & O. No. 476	308.193	1011.130
Do.	B. & O. No. 361	239.848	786.901	Near Newtons, Ohio.	B. & O. No. 477	327.404	1074.158
Do.	B. & O. No. 362	239.991	787.370	Do.	B. & O. No. 478	333.843	1095.288
Do.	B. & O. No. 363	239.916	787.124	Do.	B. & O. No. 479	333.009	1094.516
Do.	B. & O. No. 364	241.071	790.914	Near Sullivan, Ohio.	B. & O. No. 480	333.888	1101.008
Near Edenburg, Pa.	B. & O. No. 365	241.024	790.760	Do.	B. & O. No. 481	341.162	1119.296
Do.	B. & O. No. 366	242.020	794.027	Sullivan, Ohio.	1136 Canton	340.093	1137.442
Do.	B. & O. No. 367	243.439	798.683	Do.	B. & O. No. 482	342.066	1122.262
				Near Sullivan, Ohio.	B. & O. No. 483	343.465	1126.851
				Near Nova, Ohio.	B. & O. No. 484	345.845	1134.060

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Nova, Ohio.....	B. & O. No. 485.....	342.394	1123.338	Near Massillon, Ohio.....	B. & O. No. 14.....	285.079	935.297
Nova, Ohio.....	B. & O. No. 485A.....	338.649	1111.051	Do.....	B. & O. No. 15.....	284.493	933.374
Do.....	1127 ADJ.....	343.606	1127.314	Do.....	B. & O. No. 16.....	282.719	927.554
Near Nova, Ohio.....	B. & O. No. 486.....	336.484	1103.948	Do.....	B. & O. No. 17.....	286.543	940.100
Do.....	B. & O. No. 487.....	326.606	1071.540	Near Navarre, Ohio.....	B. & O. No. 18.....	298.994	980.949
Near Hereford, Ohio.....	B. & O. No. 488.....	320.082	1050.136	Do.....	B. & O. No. 19.....	305.879	1003.538
Do.....	B. & O. No. 489.....	316.260	1037.596	Near Justus, Ohio.....	B. & O. No. 20.....	304.929	1000.421
Do.....	B. & O. No. 490.....	309.340	1014.893	Do.....	B. & O. No. 21.....	297.722	976.776
Do.....	B. & O. No. 491.....	301.283	988.459	Do.....	B. & O. No. 22.....	297.175	974.982
Near Ramey, Ohio.....	B. & O. No. 492.....	305.016	1000.707	Near Beach City, Ohio.....	B. & O. No. 23.....	297.534	976.159
Near Greenwich, Ohio.....	B. & O. No. 493.....	313.635	1028.984	Beach City, Ohio.....	B. & O. No. 24.....	295.517	969.542
Do.....	B. & O. No. 494.....	317.742	1042.459	Near Beach City, Ohio.....	B. & O. No. 25.....	293.227	962.029
Do.....	B. & O. No. 495.....	316.675	1038.958	Do.....	B. & O. No. 26.....	287.946	944.703
Near Greenwich, Ohio.....	B. & O. No. 496.....	313.830	1029.624	Near Strasburg, Ohio.....	B. & O. No. 27.....	283.396	929.775
Do.....	B. & O. No. 497.....	307.673	1009.424	Do.....	B. & O. No. 28.....	281.897	924.857
Do.....	B. & O. No. 498.....	310.128	1017.478	Strasburg, Ohio.....	B. & O. No. 29.....	278.655	914.221
Do.....	B. & O. No. 499.....	315.678	1035.687	Near Strasburg, Ohio.....	B. & O. No. 30.....	278.221	912.797
Near Boughtonville, Ohio.....	B. & O. No. 500.....	310.937	1020.132	Do.....	B. & O. No. 31.....	277.316	909.828
Boughtonville, Ohio.....	B. & O. No. 501.....	301.242	988.325	Do.....	B. & O. No. 32.....	274.948	901.730
Near Boughtonville, Ohio.....	B. & O. No. 502.....	293.947	964.391	Do.....	B. & O. No. 33.....	273.464	897.190
Near Boughtonville, Ohio.....	B. & O. No. 503.....	290.096	953.725	Near Canal Dover, Ohio.....	B. & O. No. 34.....	270.107	885.176
Near Chicago Junction, Ohio.....	B. & O. No. 504.....	285.136	935.484	Do.....	B. & O. No. 35.....	268.808	881.914
Do.....	B. & O. No. 505.....	285.901	937.994	Do.....	B. & O. No. 36.....	266.657	874.857
Do.....	B. & O. No. 506.....	282.908	928.174	Do.....	B. & O. No. 37.....	269.754	885.018
Chicago Junction, Ohio.....	B. & O. No. 507.....	278.829	914.791	Do.....	B. & O. No. 38.....	272.211	893.079
Do.....	F ₃	479.850	1574.141	Near New Philadelphia, Ohio.....	B. & O. No. 38A.....	272.242	893.181
Do.....	G ₃	283.363	929.667	Do.....	B. & O. No. 39.....	270.777	888.374
Do.....	H ₃	282.205	925.868	New Philadelphia, Ohio.....	B. & O. No. 40.....	267.832	878.712
Near Chicago Junction, Ohio.....	I ₃	278.160	912.597	Near New Philadelphia, Ohio.....	B. & O. No. 41.....	264.192	866.770
Do.....	J ₃	277.655	910.940	Do.....	B. & O. No. 42.....	261.899	859.247
Do.....	K ₃	281.084	922.190	Do.....	B. & O. No. 43.....	260.962	855.173
Siam, Ohio.....	L ₃	280.529	920.177	Near Goshen, Ohio.....	B. & O. No. 44.....	260.877	855.894
Do.....	M ₃	291.202	955.385	Do.....	B. & O. No. 45.....	259.287	850.677
Near Siam, Ohio.....	N ₃	281.977	925.473	Near Midvale, Ohio.....	B. & O. No. 46.....	259.104	850.077
Near Scipio, Ohio.....	O ₃	283.077	928.728	Do.....	B. & O. No. 47.....	260.109	853.374
Near Republic, Ohio.....	859 Republic.....	282.236	925.753	Cumberland, Md.....	B. & O. No. 1.....	197.419	647.699
Do.....	883 Col.....	289.458	949.145	Near Robert Station, Md.....	B. & O. No. 3.....	192.912	632.912
Do.....	P ₃	265.871	872.278	Do.....	B. & O. No. 4.....	194.303	637.476
Near Seneca, Ohio.....	Q ₃	280.704	922.618	Near Cedar Cliff, Md.....	B. & O. No. 5.....	197.673	648.532
Near Tiffin, Ohio.....	R ₃	240.979	790.612	Do.....	B. & O. No. 6.....	197.421	647.705
Do.....	S ₃	232.401	762.469	Near Brady, Md.....	B. & O. No. 6A.....	197.290	647.276
Tiffin, Ohio.....	757 Col.....	231.113	758.243	Do.....	B. & O. No. 7.....	201.214	660.150
Do.....	775 Tiffin.....	236.311	775.297	Do.....	B. & O. No. 7A.....	203.201	666.609
Do.....	T ₃	226.101	741.800	Near McKenzie Station, Md.....	B. & O. No. 8.....	207.496	680.760
Near Tiffin, Ohio.....	U ₃	232.012	761.193	Potomac Station, Md.....	B. & O. No. 9.....	209.808	688.345
Near Bascom, Ohio.....	V ₃	233.100	764.762	Near Pinto, Md.....	B. & O. No. 10.....	204.973	672.482
Do.....	W ₃	237.208	778.240	Near Lowndes, Md.....	B. & O. No. 11.....	208.252	683.240
Bascom, Ohio.....	776 Bascom.....	236.696	776.527	Near Cresap, Md.....	B. & O. No. 12.....	213.002	698.824
Do.....	766 Tol.....	233.875	767.305	Rawlings, Md.....	B. & O. No. 13.....	214.450	703.575
Near Bascom, Ohio.....	X ₃	234.200	768.371	Near Rawlings, Md.....	B. & O. No. 14.....	218.944	718.319
Near Fostoria, Ohio.....	Y ₃	233.996	767.702	Near Black Oak, Md.....	B. & O. No. 15.....	220.969	724.962
Do.....	Z ₃	234.166	768.260	Black Oak, Md.....	B. & O. No. 16.....	226.712	743.804
Fostoria, Ohio.....	778 Fostoria.....	237.700	779.854	Near Black Oak, Md.....	B. & O. No. 17.....	225.629	740.251
Do.....	A ₃	238.071	781.071	Near Dawson, Md.....	B. & O. No. 18.....	230.453	756.078
Do.....	B ₃	238.621	782.876	Do.....	B. & O. No. 19.....	235.561	772.836
Near Fostoria, Ohio.....	C ₃	235.789	773.584	Do.....	B. & O. No. 20.....	236.579	776.176
Near Gotsend, Ohio.....	D ₃	229.958	754.454	Do.....	B. & O. No. 21.....	240.863	790.231
Near Bloomdale, Ohio.....	740 Tol.....	225.743	740.625	Near Keyser, W. Va.....	B. & O. No. 22.....	244.054	800.700
Do.....	E ₃	226.459	742.974	Keyser, W. Va.....	B. & O. No. 23.....	252.070	827.000
Bloomdale, Ohio.....	749 Bloomdale.....	228.531	749.772	Near Keyser, W. Va.....	B. & O. No. 24.....	255.300	837.597
Do.....	F ₃	229.283	752.239	Do.....	B. & O. No. 25.....	260.476	854.578
Bairdstown, Ohio.....	H ₃	225.416	739.552	Near Piedmont, W. Va.....	B. & O. No. 26.....	265.567	871.281
Galatea, Ohio.....	I ₃	221.730	727.459	Do.....	B. & O. No. 26A.....	271.051	889.273
North Baltimore, Ohio.....	J ₃	223.729	734.018	Do.....	B. & O. No. 27.....	276.175	906.084
Near North Baltimore, Ohio.....	726 Tol.....	221.480	726.639	Do.....	B. & O. No. 28.....	284.353	932.915
Do.....	K ₃	221.760	727.558	Near W. Va. Central Junction, W. Va.....	B. & O. No. 28A.....	289.043	948.302
Do.....	L ₃	218.640	717.321	Near Bloomington, Md.....	B. & O. No. 29.....	307.501	1008.860
Do.....	M ₃	217.948	715.051	Do.....	B. & O. No. 30.....	333.318	1093.561
Near Hoytville, Ohio.....	N ₃	215.670	707.577	Near Black Bear, Md.....	B. & O. No. 31.....	368.816	1210.024
Do.....	O ₃	216.192	709.290	Do.....	B. & O. No. 31A.....	390.091	1279.824
Near Deshler, Ohio.....	P ₃	216.887	711.570	Do.....	B. & O. No. 32.....	393.742	1291.802
Near Warwick, Ohio.....	B. & O. No. 449.....	292.100	958.331	Near Bond Station, Md.....	U. S. G. S.....	420.759	1380.440
Do.....	B. & O. No. 1.....	290.284	952.373	Do.....	B. & O. No. 33.....	440.544	1445.351
Do.....	B. & O. No. 2.....	299.182	948.758	Crabtree, Md.....	B. & O. No. 34.....	476.744	1564.118
Near Canal Fulton, Ohio.....	B. & O. No. 3.....	289.827	949.890	Near Frankville, Md.....	B. & O. No. 35.....	509.125	1670.354
Canal Fulton, Ohio.....	B. & O. No. 4.....	288.713	947.219	Do.....	B. & O. No. 36.....	549.890	1804.097
Near Canal Fulton, Ohio.....	B. & O. No. 5.....	289.073	948.400	Do.....	B. & O. No. 37.....	582.450	1910.921
Do.....	B. & O. No. 6.....	287.906	944.572	Do.....	B. & O. No. 38.....	617.946	2027.378
Near Pauls, Ohio.....	B. & O. No. 7.....	285.235	935.989	Near Swanton, Md.....	B. & O. No. 39.....	666.134	2185.475
Near Crystal Spring, Ohio.....	B. & O. No. 8.....	287.262	942.459	Do.....	B. & O. No. 40.....	692.372	2271.557
Do.....	B. & O. No. 9.....	286.636	940.405	Do.....	B. & O. No. 40A.....	700.218	2297.299
Do.....	B. & O. No. 10.....	289.055	948.341	Do.....	B. & O. No. 41.....	725.860	2381.426
Near Massillon, Ohio.....	B. & O. No. 11.....	284.519	933.459	Do.....	B. & O. No. 42.....	742.449	2435.851
Do.....	B. & O. No. 12.....	284.717	934.109	Near Altamont, Md.....	B. & O. No. 43.....	774.794	2541.970
Do.....	P. R. R.....	287.206	942.275	Do.....	B. & O. No. 44.....	800.997	2627.938
Do.....	B. & O. No. 13.....	286.927	941.360	Near Deer Park, Md.....	B. & O. No. 45.....	785.929	2578.502
Do.....	P. R. R. Br. No. 5.....	286.294	939.283	Do.....	B. & O. No. 46.....	770.071	2526.475
				Deer Park, Md.....	B. & O. No. 47.....	753.923	2473.496
				Do.....	B. & O. No. 47A.....	746.487	2449.099
				Do.....	U. S. G. S.....	745.903	2447.183

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Deer Park, Md.	B. & O. No. 48	742.766	2438.581	Barrackville Station, W. Va.	B. & O. No. 130	274.770	901.475
Near Mountain Lake Park, Md.	B. & O. No. 49	738.351	2422.407	Near Barrackville, W. Va.	B. & O. No. 131	277.136	909.237
Do.	B. & O. No. 50	732.949	2404.683	Do.	B. & O. No. 132	278.395	913.368
Do.	B. & O. No. 51	730.605	2396.983	Near Katy, W. Va.	B. & O. No. 133	280.166	919.178
Near Oakland, Md.	B. & O. No. 52	728.352	2389.138	Near Farmington, W. Va.	B. & O. No. 134	281.167	922.492
Oakland, Md.	B. & O. No. 53	722.699	2370.924	Do.	B. & O. No. 135	284.003	931.786
Near Oakland, Md.	B. & O. No. 53A	724.547	2377.118	Underwood Station, W. Va.	B. & O. No. 136	284.825	934.562
Do.	B. & O. No. 54	724.727	2377.708	Near Farmington, W. Va.	B. & O. No. 137	285.999	937.232
Do.	B. & O. No. 55	732.232	2402.331	Do.	B. & O. No. 138	286.615	940.336
Do.	B. & O. No. 56	744.541	2442.715	Near Downs, W. Va.	B. & O. No. 139	288.999	949.158
Near Skipnash, Md.	B. & O. No. 57	748.118	2454.450	Do.	B. & O. No. 139A	289.497	953.072
Near Hutton, Md.	B. & O. No. 58	756.599	2482.275	Do.	U. S. G. S.	290.301	953.095
Do.	B. & O. No. 59	745.409	2445.563	Downs, W. Va.	B. & O. No. 140	293.278	962.106
Near Corinth, W. Va.	B. & O. No. 59A	742.140	2434.838	Near Downs, W. Va.	B. & O. No. 141	293.512	962.904
Near Rinard, W. Va.	B. & O. No. 60	747.540	2452.554	Near Mannington, W. Va.	B. & O. No. 142	295.266	968.719
Near Riggs, W. Va.	B. & O. No. 61	756.370	2481.524	Do.	B. & O. No. 143	295.542	969.952
Near Terra Alta, W. Va.	B. & O. No. 62	769.349	2524.106	Mannington, W. Va.	B. & O. No. 144	297.924	977.486
Terra Alta, W. Va.	B. & O. No. 63	775.790	2545.238	Do.	U. S. G. S.	297.164	974.940
Near Terra Alta, W. Va.	B. & O. No. 64	765.887	2512.748	Near Mannington, W. Va.	B. & O. No. 145	297.141	974.870
Do.	B. & O. No. 65	730.141	2395.471	Do.	B. & O. No. 146	299.274	981.868
Do.	B. & O. No. 66	689.827	2263.207	Do.	B. & O. No. 147	301.604	989.512
Do.	B. & O. No. 67	654.391	2146.948	Do.	B. & O. No. 148	302.111	991.176
Near Rodamers, W. Va.	B. & O. No. 68	637.401	2091.206	Near Metz, W. Va.	B. & O. No. 149	304.739	999.798
Near Amblersburg, W. Va.	B. & O. No. 69	587.754	1928.323	Do.	B. & O. No. 150	305.523	1003.354
Do.	B. & O. No. 70	552.163	1811.555	Do.	B. & O. No. 151	301.248	1017.872
Do.	B. & O. No. 71	517.413	1697.546	Near Glover Gap, W. Va.	B. & O. No. 152	315.513	1035.146
Amblersburg, W. Va.	B. & O. No. 72	494.882	1623.625	Do.	B. & O. No. 153	322.400	1057.741
Near Amblersburg, W. Va.	B. & O. No. 73	462.182	1516.342	Do.	B. & O. No. 153A	330.516	1084.368
Near Rowlesburg, W. Va.	B. & O. No. 74	449.022	1473.166	Do.	B. & O. No. 154	341.055	1118.945
Do.	B. & O. No. 74A	442.074	1450.371	Near Cottonwood, W. Va.	B. & O. No. 155	343.309	1126.340
Do.	B. & O. No. 75	426.982	1400.857	Cottonwood, W. Va.	B. & O. No. 156	332.442	1090.687
Do.	B. & O. No. 76	454.349	1490.643	Burton, W. Va.	B. & O. No. 157	324.704	1065.300
Do.	B. & O. No. 76A	465.962	1528.744	Near Burton, W. Va.	B. & O. No. 158	316.736	1039.158
Do.	B. & O. No. 77	481.918	1581.093	Near Hundred, W. Va.	B. & O. No. 159	313.988	1030.142
Do.	B. & O. No. 78	516.904	1695.876	Do.	B. & O. No. 160	308.731	1012.895
Near Buckhorn, W. Va.	B. & O. No. 78A	525.744	1724.878	Do.	B. & O. No. 161	303.436	995.523
Do.	B. & O. No. 79	548.574	1799.780	Do.	B. & O. No. 161A	300.586	986.173
Near Anderson, W. Va.	B. & O. No. 80	566.088	1857.240	Near Littleton, W. Va.	B. & O. No. 162	295.431	969.266
Near Tunnelton, W. Va.	B. & O. No. 81	557.291	1828.379	Do.	B. & O. No. 163	289.709	950.487
Do.	B. & O. No. 82	556.698	1826.493	Do.	B. & O. No. 163A	287.905	944.568
Do.	B. & O. No. 83	543.658	1783.651	Littleton, W. Va.	B. & O. No. 164	286.914	941.317
Near West End, W. Va.	B. & O. No. 83A	531.179	1742.710	Near Littleton, W. Va.	B. & O. No. 165	309.737	1016.195
Near Austan, W. Va.	B. & O. No. 84	496.181	1627.887	Near Board Tree, W. Va.	B. & O. No. 166	337.983	1108.596
Do.	B. & O. No. 85	473.262	1552.694	Do.	B. & O. No. 167	330.375	1083.905
Do.	B. & O. No. 86	440.091	1443.865	Do.	B. & O. No. 168	308.542	1012.275
Near Newburg, W. Va.	B. & O. No. 87	407.977	1338.505	Near Belton, W. Va.	B. & O. No. 169	281.436	923.187
Do.	B. & O. No. 88	379.474	1244.991	Do.	B. & O. No. 170	273.570	897.335
Near Independence, W. Va.	B. & O. No. 89	349.706	1147.327	Near Denver Station, W. Va.	B. & O. No. 170A	270.980	889.040
Near Hardman, W. Va.	B. & O. No. 91	337.765	1108.151	Near Belton, W. Va.	B. & O. No. 171	277.633	910.868
Near Ironton, W. Va.	B. & O. No. 92	335.727	1101.464	Near Woodruff, W. Va.	B. & O. No. 172	288.001	946.852
Do.	B. & O. No. 93	327.598	1074.794	Do.	B. & O. No. 173	308.379	1011.740
Do.	B. & O. No. 94	324.444	1064.447	Near Cogley, W. Va.	B. & O. No. 174	331.448	1087.426
Near Thornton, W. Va.	B. & O. No. 95	320.568	1051.730	Do.	B. & O. No. 175	356.050	1168.141
Thornton, W. Va.	B. & O. No. 96	317.043	1040.165	Near Cameron, W. Va.	B. & O. No. 176	365.524	1199.223
Near Thornton, W. Va.	B. & O. No. 97	316.889	1039.660	Do.	B. & O. No. 177	343.038	1125.450
Do.	B. & O. No. 98	315.188	1034.079	Do.	B. & O. No. 178	323.949	1062.823
Do.	B. & O. No. 99	315.202	1034.125	Do.	B. & O. No. 179	315.456	1034.959
Near Grafton, W. Va.	B. & O. No. 100	311.291	1021.294	Loudenville, W. Va.	B. & O. No. 180	303.512	995.772
Do.	B. & O. No. 101	306.977	1007.140	Near Loudenville, W. Va.	B. & O. No. 181	300.664	986.428
Grafton, W. Va.	B. & O. No. 102	303.292	995.050	Near Glen Easton, W. Va.	B. & O. No. 182	298.075	977.934
Near Grafton, W. Va.	B. & O. No. 103	299.503	982.619	Do.	B. & O. No. 183	294.041	964.700
Fetterman, W. Va.	B. & O. No. 103A	301.386	988.797	Do.	B. & O. No. 184	282.408	926.534
Near Fetterman, W. Va.	B. & O. No. 104	301.722	989.800	Do.	B. & O. No. 184A	282.578	927.091
Do.	B. & O. No. 105	299.374	982.196	Do.	B. & O. No. 185	275.047	902.883
Do.	B. & O. No. 106	298.901	980.644	Near Rosbys Rock, W. Va.	B. & O. No. 186	262.691	861.845
Near Bush, W. Va.	B. & O. No. 107A	298.652	979.827	Do.	B. & O. No. 187	258.352	847.610
Do.	B. & O. No. 108	299.284	981.901	Do.	B. & O. No. 188	245.194	804.441
Near Valley Falls, W. Va.	B. & O. No. 109	299.592	982.911	Do.	B. & O. No. 189	240.300	789.008
Valley Falls, W. Va.	B. & O. No. 110	296.922	974.152	Do.	B. & O. No. 190	232.994	764.414
Near Valley Falls, W. Va.	B. & O. No. 111	288.017	944.936	Do.	B. & O. No. 191	226.084	741.744
Near Hammond, W. Va.	B. & O. No. 112	285.858	937.832	Do.	B. & O. No. 192	218.913	718.217
Do.	B. & O. No. 113	278.720	914.434	Do.	B. & O. No. 193	207.415	680.494
Near Powells, W. Va.	B. & O. No. 114	273.840	898.423	U. S. G. S.			
Do.	B. & O. No. 115	273.981	898.896	Near Moundsville, W. Va.	B. & O. No. 194	197.974	649.520
Near Colfax, W. Va.	B. & O. No. 116	271.103	889.444	Do.	B. & O. No. 195	197.056	646.218
Colfax, W. Va.	B. & O. No. 117	270.820	888.515	Do.	B. & O. No. 196	196.851	645.835
Near Colfax, W. Va.	B. & O. No. 118	269.867	885.389	Do.	B. & O. No. 197	203.668	688.211
Near Bentons Ferry, W. Va.	B. & O. No. 119	270.398	887.131	Do.	B. & O. No. 198	203.480	697.384
Bentons Ferry, W. Va.	B. & O. No. 120	270.771	888.355	Do.	B. & O. No. 199	204.031	699.392
Kingmont, W. Va.	B. & O. No. 121	270.755	888.302	Near Benwood Junction, W. Va.	B. & O. No. 200	200.717	658.519
Near Kingmont, W. Va.	B. & O. No. 122	268.700	881.560	Do.	B. & O. No. 200A	200.344	657.951
Do.	B. & O. No. 122A	268.631	881.334	Do.	B. & O. No. 201	202.856	695.537
Gaston Junction, W. Va.	B. & O. No. 123	269.824	885.248	Do.	B. & O. No. 202	203.829	688.729
Fairmont, W. Va.	B. & O. No. 124	270.243	886.622	Do.	B. & O. No. 114	199.752	688.194
Near Fairmont, W. Va.	B. & O. No. 125	269.514	884.231	Benwood, W. Va.	U. S. E. 94A	197.521	684.033
Do.	B. & O. No. 125A	264.770	868.666	Marietta, Ohio	U. S. E. 171B	180.231	591.308
Near Barnesville, W. Va.	B. & O. No. 126	266.257	873.545	San Diego, Cal.	Tidal 7	0.597	1.959
Do.	B. & O. No. 127	267.734	878.391	Do.	Tidal 6	2.608	8.556
Near Barrackville, W. Va.	B. & O. No. 128	270.492	887.439	Do.	Tidal 3	1.880	6.168
Do.	B. & O. No. 129	272.475	893.945	Do.	Tidal 2	3.074	10.085

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
San Diego, Cal.	Tidal 5.	2.372	7.782	Near Summit, Cal.	3462 S. B.	1055.576	3463.160
Do.	Tidal 4.	3.806	12.487	Near Hesperia, Cal.	N ₂	995.438	3265.866
Do.	Tidal 1.	2.659	8.724	Hesperia, Cal.	3190 S. B.	972.600	3190.938
Roseville, Cal.	35 Sea.	10.760	35.302	Do.	O ₂	969.334	3180.223
Near Roseville, Cal.	A.	10.158	33.327	Near Hesperia, Cal.	2856 Hesperia	870.896	2857.264
Near San Diego, Cal.	B.	6.288	20.630	Near Victorville, Cal.	P ₂	837.276	2746.963
San Diego, Cal.	C.	7.184	23.570	Victorville, Cal.	2723 S. B.	830.185	2723.699
Do.	42 S. D.	12.909	42.353	Do.	Q ₂	829.323	2720.870
Do.	City.	14.061	46.131	Do.	R ₂	832.370	2730.867
Old Town, Cal.	D.	7.753	25.436	Near Victorville, Cal.	S ₂	824.332	2704.496
American Park, Cal.	25 S. D.	7.757	25.449	Oro Grande, Cal.	T ₂	807.086	2647.915
Near Atwood, Cal.	E.	19.191	62.962	Do.	U ₂	808.606	2652.901
Near Ladrillo, Cal.	F.	29.585	97.063	Near Oro Grande, Cal.	V ₂	785.133	2575.891
Selwyn, Cal.	G.	70.857	232.470	Near Helen, Cal.	W ₂	768.958	2522.823
Linda Vista, Cal.	376 S. D.	114.838	376.764	Do.	X ₂	757.353	2484.749
Sorrento, Cal.	31 S. D.	9.644	31.640	Helen, Cal.	Y ₂	740.656	2429.970
Do.	H.	12.330	40.452	Near Helen, Cal.	Z ₂	740.239	2428.601
Near Del Mar, Cal.	I.	46.342	152.040	Do.	A ₂	724.245	2376.127
Del Mar, Cal.	J.	27.608	90.577	Near Cottonwood, Cal.	B ₂	710.375	2330.622
Near Encinitas, Cal.	K.	22.184	72.782	Cottonwood, Cal.	C ₂	692.559	2272.171
Encinitas, Cal.	L.	28.040	91.995	Near Cottonwood, Cal.	D ₂	688.401	2258.824
Near Carlsbad, Cal.	M.	13.477	44.216	Do.	E ₂	684.788	2246.675
Carlsbad, Cal.	N.	16.933	55.554	Near Todd, Cal.	F ₂	680.143	2231.436
Oceanside, Cal.	O.	13.559	44.484	Near Barstow, Cal.	G ₂	651.898	2138.769
Do.	P.	25.565	83.875	Barstow, Cal.	H ₂	640.701	2102.033
Do.	Q.	20.634	67.697	Do.	I ₂	643.569	2111.443
Do.	R.	19.661	64.505	Do.	J ₂	648.970	2129.163
Near Las Flores, Cal.	S.	22.869	75.029				
Do.	T.	17.801	58.402	Near Pocatello, Idaho.	L ₂	1361.664	4467.393
Las Flores, Cal.	84 S. B.	25.854	84.822	Near Ross Fork, Idaho.	M ₂	1361.967	4468.387
Don, Cal.	U.	41.704	136.824	Ross Fork, Idaho.	N ₂	1358.812	4458.036
Near Don, Cal.	165 S. B.	50.525	165.764	Do.	O ₂	1354.354	4443.410
San Onofre, Cal.	28 S. B.	8.765	28.757	Gibson, Idaho.	P ₂	1360.490	4463.541
Near San Onofre, Cal.	V.	3.070	10.072	Near Blackfoot, Idaho.	Q ₂	1366.210	4482.307
Near Mateo, Cal.	W.	4.637	15.213	Do.	O. S. L. 4.	1368.312	4489.204
Near Serra, Cal.	X.	12.605	41.355	Blackfoot, Idaho.	R ₂	1371.625	4500.073
San Juan Capistrano, Cal.	103 S. B.	31.709	104.032	Do.	S ₂	1371.111	4498.387
Do.	Y.	36.843	120.875	Do.	T ₂	1370.998	4498.016
Do.	Z.	35.313	115.856	Do.	U ₂	1372.216	4502.012
Near El Toro, Cal.	A ₁	85.377	280.107	Near Wapello, Idaho.	V ₂	1382.966	4537.281
Do.	278 S. B.	85.108	279.228	Wapello, Idaho.	W ₂	1384.365	4541.871
El Toro, Cal.	444 S. B.	135.641	445.016	Near Wapello, Idaho.	X ₂	1389.917	4560.086
Near Irvine, Cal.	B ₁	78.706	258.221	Do.	Y ₂	1391.240	4564.427
Irvine, Cal.	C ₁	59.147	194.052	Do.	Z ₂	1393.170	4570.759
Near Aliso, Cal.	D ₁	24.808	81.391	Monroe, Idaho.	A ₂	1403.786	4605.588
Santa Ana, Cal.	E ₁	32.248	105.800	Near Monroe, Idaho.	B ₂	1405.162	4610.102
Do.	F ₁	37.525	123.114	Shelley, Idaho.	C ₂	1411.023	4629.331
Do.	G ₁	39.065	128.166	Do.	D ₂	1410.225	4626.713
Do.	City.	37.883	124.288	Near Idaho Falls, Idaho.	E ₂	1422.102	4665.680
Do.	H ₁	40.686	133.484	Idaho Falls, Idaho.	O. S. L. 7.	1434.130	4705.141
Orange, Cal.	I ₁	57.052	187.178	Do.	F ₂	1435.540	4709.767
Do.	J ₁	60.245	197.654	Do.	G ₂	1433.738	4703.855
Near Orange, Cal.	K ₁	57.492	188.622	Do.	City.	1434.365	4705.912
Olive, Cal.	L ₁	83.617	274.334	Do.	H ₂	1435.044	4708.140
Near Olive, Cal.	M ₁	73.529	241.236	Do.	O. S. L. 6.	1433.391	4702.717
Richfield, Cal.	N ₁	75.143	246.532	Near Payne, Idaho.	I ₂	1439.261	4721.975
Near Yorba, Cal.	R ₁	88.545	290.801	Do.	J ₂	1447.162	4747.897
Horse Shoe Bend, Cal.	O ₁	116.424	381.968	Near Bassett, Idaho.	K ₂	1453.447	4768.517
Near Gypsum, Cal.	P ₁	122.564	402.112	Market Lake, Idaho.	L ₂	1455.520	4775.318
Near Crary, Cal.	Q ₁	143.307	470.167	Do.	M ₂	1456.082	4777.162
Crary, Cal.	494 S. B.	150.806	494.769	Near Market Lake, Idaho.	N ₂	1456.946	4779.997
Near Crary, Cal.	R ₂	154.635	507.332	Do.	O ₂	1461.402	4794.616
Corona, Cal.	S ₂	184.856	606.482	Near Hawgood, Idaho.	O. S. L. 8.	1469.228	4820.292
Do.	T ₂	208.998	685.688	Do.	P ₂	1475.852	4842.024
Do.	City.	205.433	673.991	Hawgood, Idaho.	Q ₂	1469.193	4820.177
Riverside, Cal.	U ₂	204.938	669.579	Hamer, Idaho.	R ₂	1463.596	4801.814
Do.	687 May.	209.706	688.010	Near Camas, Idaho.	S ₂	1463.873	4802.723
Do.	V ₂	219.634	720.583	Camas, Idaho.	T ₂	1468.499	4817.900
Do.	814 Arlington.	248.565	815.500	Near Camas, Idaho.	U ₂	1475.718	4841.585
Do.	W ₂	257.958	846.320	Jones, Idaho.	V ₂	1492.541	4896.778
Do.	X ₂	258.397	847.757	Near Jones, Idaho.	W ₂	1511.833	4960.072
Do.	861 Casa Blanca.	262.732	861.980	Dubois, Idaho.	X ₂	1567.728	5143.454
Do.	863 Olivewood.	263.241	863.650	Do.	Y ₂	1569.812	5150.291
Do.	Y ₂	258.534	848.207	Near High Bridge, Idaho.	Z ₂	1671.905	5485.242
Do.	851 Riverside.	259.642	851.842	Do.	A ₂	1683.093	5521.948
Do.	Z ₂	261.418	857.669	High Bridge, Idaho.	B ₂	1690.069	5544.835
Highgrove, Cal.	945 Highgrove.	288.278	945.792	Do.	O. S. L. 10.	1701.482	5582.279
Colton, Cal.	A ₂	298.149	978.177	Near Spencer, Idaho.	C ₂	1779.595	5838.555
San Bernardino, Cal.	B ₂	327.687	1075.087	Spencer, Idaho.	D ₂	1793.295	5883.502
Do.	1048 San Bernardino	319.656	1048.738	Do.	E ₂	1792.551	5881.061
Do.	C ₂	320.375	1051.097	Do.	O. S. L. 11.	1793.455	5884.027
Do.	City.	318.545	1045.093	Near Spencer, Idaho.	F ₂	1804.488	5920.224
Do.	D ₂	335.303	1100.074	Do.	G ₂	1834.719	6019.407
Near Verdemon, Cal.	1420 S. B.	433.150	1421.093	Near Humphrey, Idaho.	H ₂	1852.842	6078.866
Do.	E ₂	460.617	1511.208	Humphrey, Idaho.	I ₂	1979.376	6494.003
Verdemon, Cal.	F ₂	529.099	1735.876	Do.	J ₂	1985.671	6514.656
Devore, Cal.	O ₂	616.427	2022.394	Near Monida, Mont.	K ₂	2047.081	6716.132
Near Devore, Cal.	2008 S. B.	612.539	2009.630	Monida, Mont.	A.	2071.329	6795.685
Keenbrook, Cal.	H ₂	756.013	2480.353	Do.	B.	2069.551	6789.852
Near Cajon, Cal.	I ₂	872.808	2863.255	Near Monida, Mont.	C.	2030.968	6663.267
Dell, Cal.	2768 S. B.	843.866	2768.584	Near Williams, Mont.	D.	2023.890	6640.046
Cajon, Cal.	J ₂	892.396	2927.803	Do.	E.	2006.774	6583.891
Near Gish, Cal.	K ₂	994.646	3263.208	Do.	F.	1995.410	6549.608
Near Cajon, Cal.	2885 S. B.	1123.346	3685.511	Do.	G.	1954.053	6410.922
Summit, Cal.	L ₂	1165.442	3823.621	Do.	H.	1907.318	6257.592
Near Summit, Cal.	M ₂	1137.021	3730.376	Lima, Mont.			

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Lima, Mont.	O. S. L. 14.	1908.302	6259.453	Salt Lake City, Utah.	W.	1290.123	4232.078
Do.	I.	1906.723	6255.640	Near Nebo, Cal.	K.	629.370	2064.858
Near Dell, Mont.	J.	1852.520	6077.809	Do.	L.	618.713	2023.398
Do.	K.	1834.844	6019.817	Daggett, Cal.	M.	611.348	2005.865
Dell, Mont.	L.	1833.586	6015.890	Near Daggett, Cal.	N.	602.680	1977.230
Do.	M.	1830.273	6004.821	Minneola, Cal.	O.	583.699	1915.019
Near Crab Tree, Mont.	N.	1786.501	5861.212	Near Minneola, Cal.	P.	574.067	1883.418
Crab Tree, Mont.	O.	1772.985	5816.868	Newberry, Cal.	Q.	557.761	1829.921
Near Crab Tree, Mont.	P.	1738.970	5705.271	Near Newberry, Cal.	R.	549.623	1803.218
Red Rock, Mont.	Q.	1706.020	5597.167	Troy, Cal.	S.	541.415	1776.293
Do.	R.	1705.181	5594.415	Near Troy, Cal.	T.	546.554	1793.153
Armstead, Mont.	S.	1673.984	5492.662	Hector, Cal.	U.	567.715	1862.578
Near Armstead, Mont.	T.	1665.212	5463.283	Near Pisgah, Cal.	V.	614.599	2016.397
Near Grayling, Mont.	U.	1657.970	5439.523	Pisgah, Cal.	W.	655.072	2149.182
Grayling, Mont.	V.	1641.135	5384.290	Near Pisgah, Cal.	X.	660.339	2168.497
Near Barratts, Mont.	W.	1608.654	5277.726	Lavie, Cal.	Y.	661.346	2171.735
Do.	X.	1579.148	5180.921	Near Lavie, Cal.	Z.	649.110	2129.021
Near Dillon, Mont.	Y.	1572.082	5157.739	Arctic, Cal.	A.	617.090	2024.536
Dillon, Mont.	O. S. L. 16.	1553.457	5096.633	Near Arctic, Cal.	B.	587.143	1926.318
Do.	Z or Magnetic Station	1560.361	5119.284	Near Ludlow, Cal.	C.	555.506	1822.222
Do.	A.	1552.855	5094.658	Ludlow, Cal.	D.	540.434	1773.074
Do.	B.	1550.519	5086.994	Near Ludlow, Cal.	E.	534.353	1753.123
Do.	City.	1551.557	5090.400	Near Ash Hill, Cal.	F.	554.666	1819.766
Near Bond, Mont.	C.	1550.606	5087.280	Ash Hill, Cal.	G.	592.400	1945.585
Bond, Mont.	D.	1573.105	5161.095	Near Ash Hill, Cal.	H.	561.560	1842.394
Near Apex, Mont.	E.	1622.228	5322.260	Near Klondike, Cal.	I.	547.471	1796.161
Apex, Mont.	F.	1653.926	5426.255	Do.	J.	526.699	1727.913
Near Glen, Mont.	G.	1513.173	4964.468	Klondike, Cal.	K.	501.914	1648.008
Glen, Mont.	H.	1522.818	4996.112	Near Siberia, Cal.	L.	440.408	1444.903
Do.	I.	1524.498	5001.624	Siberia, Cal.	M.	388.108	1272.899
Near Lanyon, Mont.	J.	1538.915	5048.924	Near Siberia, Cal.	N.	337.522	1107.354
Lanyon, Mont.	K.	1540.241	5053.274	Near Nome, Cal.	O.	305.736	1003.069
Browne, Mont.	L.	1544.488	5067.208	Near Nome, Cal.	P.	273.093	896.072
Near Melrose, Mont.	M.	1563.468	5129.478	Bagdad, Cal.	Q.	241.113	791.052
Melrose, Mont.	N.	1580.078	5183.973	Near Bagdad, Cal.	R.	222.648	730.471
Do.	O.	1579.296	5181.407	Amboy, Cal.	S.	188.256	611.403
Near Big Hole, Mont.	P.	1604.992	5265.711	Near Bengal, Cal.	T.	205.853	674.490
Big Hole, Mont.	Q.	1612.688	5290.960	Bengal, Cal.	U.	216.137	709.109
Maiden Rock, Mont.	R.	1620.621	5316.987	Near Cadiz, Cal.	V.	206.488	677.453
Near Divide, Mont.	S.	1629.149	5344.966	Do.	W.	231.545	759.661
Divide, Mont.	T.	1644.468	5395.225	Cadiz, Cal.	X.	249.899	818.802
Woodin, Mont.	U.	1694.077	5557.984	Near Siam, Cal.	Y.	291.280	955.641
Near Woodin, Mont.	V.	1698.487	5572.453	Siam, Cal.	Z.	316.295	1037.711
Beaudines Spur, Mont.	W.	1733.299	5686.665	Near Danby, Cal.	A.	344.800	1133.724
Feely, Mont.	X.	1772.368	5814.844	Danby, Cal.	B.	412.117	1352.087
Near Buxton, Mont.	Y.	1697.986	5570.809	Near Arimo, Cal.	C.	448.685	1472.060
Do.	O. S. L.	1697.001	5567.577	Arimo, Cal.	D.	467.237	1532.927
Buxton, Mont.	Z.	1682.842	5521.124	Near Arimo, Cal.	E.	498.268	1634.734
Silver Bow, Mont.	A.	1626.865	5337.473	Essex, Cal.	F.	527.088	1729.321
Do.	5327 Butte.	1627.111	5338.280	Near Fenner, Cal.	G.	582.552	1911.256
Near Butte, Mont.	5388 Butte.	1645.772	5399.504	Fenner, Cal.	H.	658.998	2096.446
Do.	B.	1650.709	5415.701	Near Piute, Cal.	I.	676.434	2219.267
Do.	C.	1657.159	5436.862	Piute, Cal.	J.	709.834	2328.847
Do.	R. H. C. 5441.	*1659.618	5444.930	Near Goffs, Cal.	K.	753.568	2472.331
Butte, Mont.	D.	*1674.299	5493.096	Goffs, Cal.	L.	786.800	2581.360
Do.	E.	*1691.666	5550.074	Near Goffs, Cal.	M.	784.060	2572.371
Do.	R. H. C. 5563.	*1696.856	5567.102	Near Vontrigger, Cal.	N.	905.892	2972.812
Do.	R. H. C. 5631.	*1717.357	5634.362	Vontrigger, Cal.	O.	1026.878	3369.016
Do.	R. H. C. 5767.	*1758.365	5768.902	Near Blackburn, Cal.	P.	1068.477	3505.495
Do.	5712 Butte.	*1741.980	5715.146	Blackburn, Cal.	Q.	1130.730	3709.737
Do.	City.	*1758.224	5768.440	Near Ledge, Cal.	R.	1244.849	4084.141
Do.	R. H. C. 5811.	*1770.240	5807.862	Ledge, Cal.	S.	1326.211	4351.077
Do.	R. H. C. 5716.	*1742.835	5717.951	Near Ledge, Cal.	T.	1339.723	4395.898
Do.	R. H. C. 5566.	*1697.422	5568.959	Purdy, Cal.	U.	1378.992	4524.243
Do.	F.	*1679.410	5509.864	Near Barnwell, Cal.	V.	1443.139	4734.099
Do.	R. H. C. 5485.	*1673.112	5489.202	Barnwell, Cal.	W.	1465.445	4807.881
				Near Barnwell, Cal.	X.	1393.658	4572.392
				Vanderbilt, Cal.	Y.	1266.042	4153.673
Near Evona, Utah.	A.	1321.547	4335.775	Near Vanderbilt, Cal.	Z.	1183.295	3882.194
Near Roy, Utah.	B.	1342.868	4405.726	Leastalk, Cal.	A.	1039.369	3508.880
Do.	C.	1352.224	4436.421	Near Leastalk, Cal.	B.	1036.855	3401.749
Near Syracuse Junction, Utah.	D.	1351.689	4434.666	Moore, Cal.	C.	1000.954	3283.963
Near Syracuse Grove, Utah	Salt Lake Northwest Base.	1289.475	4230.553	Near Nipton, Cal.	D.	957.056	3139.941
Near Syracuse, Utah.	K. S. 8.	1292.556	4240.660	Nipton, Cal.	E.	922.019	3025.057
Near Kaysville, Utah.	Salt Lake Southeast Base.	1283.940	4212.393	Near Nipton, Cal.	F.	888.732	2915.781
Near Layton, Utah.	H.	1355.674	4447.741	Lyons, Cal.	G.	854.618	2803.856
Layton, Utah.	I.	1327.635	4355.749	Calada, Cal.	H.	836.770	2745.303
Kaysville, Utah.	J.	1308.657	4293.485	Roach, Nev.	A.	796.333	2612.636
Near Farmington, Utah.	K.	1295.546	4250.470	Borax, Nev.	B.	824.987	2703.344
Do.	L.	1295.029	4248.774	Jean, Nev.	C.	835.661	2866.336
Farmington, Utah.	M.	1298.635	4260.605	Near Jean, Nev.	D.	903.195	2963.233
Near Farmington, Utah.	N.	1280.893	4221.983	Sutor, Nev.	E.	924.622	3033.531
Centerville, Utah.	O.	1294.064	4225.008	Near Erie, Nev.	F.	942.246	3091.352
Woods Cross, Utah.	P.	1308.433	4292.751	Erie, Nev.	G.	951.631	3122.143
Simkins, Utah.	Q.	1304.697	4280.493	Near Sloan, Nev.	H.	871.562	2859.450
Stockyard Junction, Utah.	R.	1298.484	4260.110	Sloan, Nev.	I.	862.216	2828.787
Near Salt Lake City, Utah.	S.	1287.627	4224.490	Near Sloan, Nev.	J.	828.396	2717.534
Salt Lake City, Utah.	T.	1298.492	4260.136	Bard, Nev.	K.	784.798	2574.792
Do.	U.	1319.998	4330.697	Near Arden, Nev.	L.	758.689	2491.192
Do.	V.	1298.310	4259.539	Do.	M.	732.007	2401.593
				Do.	N.	711.595	2334.624
				Brackn, Nev.	2136B.	660.661	2167.519
				Near Brackn, Nev.	2136B.	650.564	2134.392

*A number of bench marks in Butte, Mont., and vicinity have changed in elevation, probably as a result of the mining operations. The elevations published here for that section should be used with caution, and any engineering or surveying operations should be started from at least two bench marks, the relation between which has not been disturbed, as shown by the new leveling done.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Las Vegas, Nev.	O.	618.357	2028.727	Youngs Point, Mont.	M.	1044.752	3427.657
Do.	2024B.	616.443	2022.447	Near Park City, Mont.	N.	1039.764	3411.292
Do.	P.	615.356	2018.880	Park City, Mont.	O.	1035.024	3395.741
Do.	2033B.	619.170	2031.393	Near Park City, Mont.	P.	1025.432	3364.271
Near Butte, Mont.	G.	1709.923	5609.972	Near Laurel, Mont.	Q.	1018.941	3342.976
Ekones, Mont.	H.	1792.915	5882.255	Laurel, Mont.	R.	1005.144	3297.710
Highview, Mont.	I.	1927.704	6324.475	Near Laurel, Mont.	S.	994.178	3261.732
Homestake, Mont.	J.	1829.628	6031.772	Foster, Mont.	T.	983.447	3226.526
Lewis Spur, Mont.	K.	1874.955	6151.415	Near Yegen, Mont.	U.	979.327	3213.009
Near Lewis Spur, Mont.	L.	1812.438	5946.307	Yegen, Mont.	V.	971.597	3187.648
Welch, Mont.	M.	1732.862	5685.231	Near Billings, Mont.	W.	961.216	3153.589
Near Welch, Mont.	N.	1661.526	5451.190	Billings, Mont.	X.	953.254	3127.467
Spire Rock, Mont.	O.	1589.422	5214.629	Do.	Y.	953.232	3127.395
Near Pipestone, Mont.	P.	1523.756	4999.189	Do.	Z.	953.325	3127.700
Pipestone, Mont.	Q.	1432.994	4701.414	Near Billings, Mont.	A.	951.148	3120.558
Near Whitehall, Mont.	R.	1348.223	4423.295	Near Lockwood, Mont.	B.	947.828	3109.666
Whitehall, Mont.	S.	1327.458	4355.168	Do.	C.	948.754	3112.704
Do.	T.	*1329.776	4362.773	Near Huntley, Mont.	D.	928.731	3047.012
Do.	U.	†1329.204	4360.897	Do.	U. S. R. S. 1.	925.124	3035.178
Near Whitehall, Mont.	V.	1313.405	4309.063	Do.	U. S. R. S. 2.	923.472	3029.758
Jefferson Island, Mont.	W.	1302.594	4273.594	Do.	U. S. R. S. 3.	922.745	3027.373
Near Lime Spur, Mont.	X.	1301.334	4269.460	Stewart, Nev.	Q.	580.977	1906.089
Lime Spur, Mont.	Y.	1291.562	4237.400	Near Valley, Nev.	R.	601.646	1973.901
Near Sappington, Mont.	Z.	1284.835	4215.329	Valley, Nev.	S.	612.282	2008.795
Sappington, Mont.	A.	1276.042	4186.481	Near Valley, Nev.	T.	650.762	2135.042
Near Sappington, Mont.	B.	1268.734	4162.505	Dike, Nev.	U.	685.661	2249.540
Willow Creek, Mont.	C.	1265.726	4152.636	Near Dike, Nev.	V.	735.535	2413.168
Near Willow Creek, Mont.	D.	1251.283	4105.251	Apex, Nev.	W.	754.150	2474.240
Near Three Forks, Mont.	E.	1244.466	4082.885	Near Apex, Nev.	X.	709.291	2327.066
Three Forks, Mont.	F.	1239.194	4065.589	Garnet, Nev.	Y.	683.429	2242.216
Do.	I Three Forks.	1237.188	4059.008	Do.	Z.	681.925	2237.283
Old Gallatin City, Mont.	S. B. Gallatin.	1234.555	4050.369	Near Dry Lake, Nev.	A.	651.639	2137.919
Near Old Gallatin City, Mont.	G.	1231.046	4038.857	Dry Lake, Nev.	B.	638.121	2093.568
Do.	Gauge B. M.	1232.230	4042.741	Near Dry Lake, Nev.	C.	636.441	2088.057
Near Logan, Mont.	H.	1240.749	4070.691	Crystal, Nev.	D.	639.779	2099.008
Logan, Mont.	I.	1250.116	4101.422	Ute, Nev.	E.	619.781	2033.398
Near Manhattan, Mont.	J.	1282.374	4207.255	Byron, Nev.	F.	588.959	1932.276
Manhattan, Mont.	K.	1292.913	4241.832	Near Moapa, Nev.	G.	544.169	1785.328
Near Manhattan, Mont.	L.	1299.471	4263.348	Moapa, Nev.	H.	484.368	1589.130
Central Park, Mont.	M.	1320.000	4330.700	Do.	I.	508.269	1667.546
Near Belgrade, Mont.	N.	1341.393	4400.887	Do.	J.	507.988	1666.624
Belgrade, Mont.	O.	1357.443	4453.544	Do.	K.	510.894	1676.158
Near Belgrade, Mont.	P.	1369.350	4492.609	Acton, Nev.	L.	514.019	1686.411
Storey, Mont.	Q.	1402.371	4600.945	Guelph, Nev.	M.	532.902	1748.362
Bozeman, Mont.	R.	1448.802	4753.278	Near Rox, Nev.	N.	531.829	1744.842
Near Bozeman, Mont.	S.	1473.408	4834.006	Rox, Nev.	O.	546.981	1794.553
Near Gordon, Mont.	T.	1549.013	5082.053	Do.	P.	580.460	1904.398
Chestnut, Mont.	U.	1601.428	5254.018	Hoya, Nev.	Q.	589.179	1932.998
Near West End, Mont.	V.	1652.806	5422.581	Galt, Nev.	R.	617.905	2027.243
West End, Mont.	W.	1687.643	5536.875	Near Galt, Nev.	S.	684.069	2244.316
Muir, Mont.	X.	1688.049	5538.207	Vigo, Nev.	T.	724.871	2378.181
Near Hoppers, Mont.	Y.	1627.948	5341.026	Near Vigo, Nev.	U.	741.844	2433.867
Hoppers, Mont.	Z.	1585.822	5202.818	Near Carp, Nev.	V.	747.299	2451.763
Near Coal Spur, Mont.	A.	1489.059	4885.354	Carp, Nev.	W.	769.394	2524.253
Do.	B.	1409.374	4623.921	Do.	X.	789.415	2589.939
Livingston, Mont.	C.	1371.774	4500.562	Do.	Y.	788.910	2588.282
Do.	D.	1370.344	4495.870	Do.	Z.	790.860	2594.680
Near Africa, Mont.	E.	1355.866	4448.370	St. George, Nev.	A.	821.470	2695.106
Africa, Mont.	F.	1352.903	4438.649	Leith, Nev.	B.	894.055	2933.245
Mission, Mont.	G.	1341.990	4379.847	Near Leith, Nev.	C.	913.604	2997.383
Near Elton, Mont.	H.	1323.698	4342.832	Do.	D.	958.498	3144.672
Elton, Mont.	I.	1307.849	4290.835	Kyle, Nev.	E.	986.132	3235.335
Near Springdale, Mont.	J.	1298.143	4258.991	Near Kyle, Nev.	F.	1001.555	3285.935
Springdale, Mont.	K.	1287.300	4223.417	Elgin, Nev.	G.	1051.638	3450.413
Near Springdale, Mont.	L.	1277.883	4192.521	Do.	H.	1056.580	3466.463
Carney, Mont.	M.	1265.517	4151.950	Do.	I.	1056.018	3464.619
Dehart, Mont.	N.	1252.456	4109.099	Boyd, Nev.	J.	1150.866	3775.800
Near Dehart, Mont.	O.	1256.002	4120.733	Near Boyd, Nev.	K.	1196.782	3926.442
Bigtimber, Mont.	P.	1244.040	4081.488	Stine, Nev.	L.	1228.894	4031.796
Near Bigtimber, Mont.	Q.	1232.724	4044.362	Cana, Nev.	M.	1237.721	4060.756
Near Reynolds, Mont.	R.	1204.210	3950.812	Near Stine, Nev.	N.	1266.809	4156.189
Near Greycliff, Mont.	S.	1197.577	3929.051	Etna, Nev.	O.	1299.463	4263.321
Greycliff, Mont.	T.	1196.868	3926.724	Caliente, Nev.	P.	1337.994	4389.735
Near Pateum, Mont.	U.	1175.702	3857.282	Do.	Q.	1341.793	4402.200
Pateum, Mont.	V.	1177.798	3864.159	Do.	R.	1355.196	4446.172
Near Quebec, Mont.	W.	1162.136	3812.774	Do.	S.	1342.559	4404.713
Reedpoint, Mont.	X.	1140.620	3742.184	Do.	T.	1344.924	4412.471
Near Reedpoint, Mont.	Y.	1136.449	3728.500	Eccles, Nev.	U.	1409.706	4625.010
Oneida, Mont.	Z.	1130.119	3707.732	Near Minto, Nev.	V.	1437.344	4715.686
Near Oneida, Mont.	A.	1128.682	3703.017	Minto, Nev.	W.	1466.294	4810.666
Merrill, Mont.	B.	1117.257	3665.534	Big Springs, Nev.	X.	1542.892	5061.971
Near Merrill, Mont.	C.	1115.228	3658.877	Islen, Nev.	Y.	1592.226	5223.828
Wataga, Mont.	D.	1107.084	3632.158	Barclay, Nev.	Z.	1625.437	5332.788
Near Wataga, Mont.	E.	1099.340	3606.751	Acoma, Nev.	A.	1681.859	5517.899
Columbus, Mont.	F.	1097.159	3599.596	Do.	B.	1682.842	5521.124
Do.	G.	1092.838	3585.419	Do.	C.	1684.329	5526.003
Near Columbus, Mont.	H.	1078.861	3539.563	Near Acoma, Nev.	D.	1709.336	5608.046
Misko, Mont.	I.	1060.210	3543.989	Brown, Nev.	E.	1761.902	5780.507
Near Rapids, Mont.	J.	1068.704	3506.240	Crestline, Nev.	F.	1823.661	5983.128
Rapids, Mont.	K.	1063.590	3489.461	Do.	G.	1824.001	5984.244
Near Rapids, Mont.	L.	1059.146	3474.881	Lien, Nev.	H.	1769.005	5803.811
				Uvada, Utah.	A.	1723.456	5654.372
				Tomas, Utah.	B.	1683.278	5522.555

* As originally set.

† As moved. New elevation from measurements by the local authorities.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Modena, Utah.....	C _a	1678.808	5507.889	Near Lynn Junction, Utah.	B _a	1458.476	4785.017
Modena, Utah.....	D _a	1664.782	5461.872	Near Clino, Utah.....	C _a	1452.804	4766.407
Do.....	E _a	1667.195	5469.789	Do.....	D _a	1449.876	4756.801
Do.....	F _a	1665.792	5463.186	Near Akin, Utah.....	E _a	1419.252	4656.350
Do.....	G _a	1668.414	5473.788	Akin, Utah.....	F _a	1414.110	4639.136
Escalante, Utah.....	H _a	1616.625	5303.877	Near Oasis, Utah.....	G _a	1404.366	4609.126
Near Morton, Utah.....	I _a	1588.878	5212.844	Oasis, Utah.....	H _a	1400.173	4596.734
Morton, Utah.....	J _a	1577.766	5176.387	Do.....	I _a	1401.637	4596.599
Beryl, Utah.....	K _a	1568.923	5150.656	Near Oasis, Utah.....	J _a	1395.324	4577.803
Do.....	L _a	1570.447	5152.375	Van, Utah.....	K _a	1393.369	4571.431
Do.....	M _a	1568.791	5146.942	Jerome, Utah.....	L _a	1392.244	4570.726
Sahara, Utah.....	N _a	1587.773	5209.219	Clear Lake, Utah.....	M _a	1395.720	4579.126
Do.....	O _a	1585.523	5201.837	Near Neels, Utah.....	N _a	1418.695	4654.502
Ford, Utah.....	P _a	1569.300	5148.612	Near Borden, Utah.....	O _a	1450.634	4759.288
Lund, Utah.....	Q _a	1549.696	5084.294	Near Goss, Utah.....	P _a	1468.046	4809.853
Do.....	R _a	1549.364	5083.205	Goss, Utah.....	Q _a	1451.584	4762.406
Do.....	S _a	1548.672	5083.005	Near Goss, Utah.....	R _a	1448.547	4801.654
Kerr, Utah.....	5092 RLund	1548.836	5081.473	Cruz, Utah.....	S _a	1465.303	4873.031
Latimer, Utah.....	T _a	1549.391	5083.205	Near Cruz, Utah.....	T _a	1476.652	4894.659
Near Nada, Utah.....	U _a	1546.594	5074.117	Near Pumice, Utah.....	U _a	1473.228	4853.416
Nada, Utah.....	V _a	1544.239	5066.391	Pumice, Utah.....	V _a	1490.868	4858.481
Near Thermo, Utah.....	W _a	1546.358	5073.343	Near Pumice, Utah.....	W _a	1478.552	4850.883
Thermo, Utah.....	X _a	1536.862	5042.188	Black Rock, Utah.....	X _a	1479.167	4852.901
Do.....	Y _a	1533.391	5030.718	Do.....	Y _a	1479.385	4853.615
Do.....	Z _a	1535.949	5039.193	Malone, Utah.....	Z _a	1490.379	4889.685
Laho, Utah.....	A _a	1534.616	5034.819	Near Read, Utah.....	A _a	1484.912	4871.749
Upton, Utah.....	B _a	1526.448	5008.021	Read, Utah.....	B _a	1488.771	4884.410
Near Milford, Utah.....	C _a	1518.294	4981.270	Do.....	C _a	1488.574	4883.753
Milford, Utah.....	D _a	1514.875	4970.052	Near Read, Utah.....	D _a	1495.301	4900.814
Do.....	E _a	1513.605	4965.886	Zenda, Utah.....	E _a	1505.984	4940.882
Do.....	F _a	1512.807	4961.268				
Do.....	G _a	1511.242	4958.133				
Opal, Utah.....	5084 FRR	1510.784	4956.631				
Near Zenda, Utah.....	H _a	1514.831	4969.908				
	I _a	1511.087	4957.625				
Salt Lake City, Utah.....	4251 Slak.....	1290.283	4252.905				
Do.....	4352 Slak.....	1327.285	4354.601				
Do.....	X ₁	1288.501	4227.357				
Do.....	O. S. L. 4222.57.	1288.644	4227.827				
Near Buena Vista, Utah.....	Y ₁	1289.086	4229.276				
Do.....	Z ₁	1287.798	4225.051				
Near Riter, Utah.....	A ₂	1288.930	4228.961				
Near Garfield, Utah.....	B ₂	1285.830	4218.594				
Do.....	C ₂	1286.950	4222.268				
Garfield, Utah.....	D ₂	1288.096	4226.028				
Do.....	E ₂	1292.307	4239.844				
Near Garfield, Utah.....	F ₂	1287.592	4224.375				
Do.....	G ₂	1288.538	4227.478				
Lake Point, Utah.....	H ₂	1290.688	4234.533				
Near Lake Point, Utah.....	I ₂	1292.438	4240.273				
Near Morris, Utah.....	J ₂	1298.177	4259.103				
Morris, Utah.....	K ₂	1324.363	4345.014				
Erda, Utah.....	L ₂	1335.025	4379.994				
Near Erda, Utah.....	M ₂	1382.518	4535.811				
Shields, Utah.....	N ₂	1412.907	4635.512				
Near Tooele, Utah.....	O ₂	1438.753	4720.309				
Do.....	P ₂	1472.027	4829.476				
Near Stockton, Utah.....	Q ₂	1500.586	4923.173				
Stockton, Utah.....	R ₂	1522.824	4996.132				
Near Stockton, Utah.....	S ₂	1544.657	5067.762				
Do.....	T ₂	1534.009	5032.828				
St. John, Utah.....	U ₂	1516.005	4973.760				
Near Ajax, Utah.....	V ₂	1530.130	5020.102				
Do.....	W ₂	1536.320	5040.410				
Faust, Utah.....	X ₂	1542.984	5062.273				
Near Faust, Utah.....	Y ₂	1600.918	5252.345				
Do.....	Z ₂	1614.843	5298.031				
Vernon, Utah.....	A ₃	1646.442	5401.702				
Near Vernon, Utah.....	B ₃	1679.866	5511.360				
Dunbar, Utah.....	C ₃	1685.391	5532.774				
Near Dunbar, Utah.....	D ₃	1716.049	5630.071				
Near Lofgreen, Utah.....	E ₃	1728.248	5670.093				
Lofgreen, Utah.....	F ₃	1751.339	5745.851				
Near Boulder, Utah.....	G ₃	1768.661	5802.682				
Boulder, Utah.....	H ₃	1821.394	5975.690				
Near Boulder, Utah.....	I ₃	1835.908	6023.308				
Near Tintic, Utah.....	J ₃	1835.012	6020.368				
Tintic, Utah.....	K ₃	1811.323	5942.649				
Near Tintic, Utah.....	L ₃	1785.800	5858.912				
Eureka, Utah.....	M ₃	1833.549	6015.569				
Near Tintic, Utah.....	U. S. G. S. 6394.....	1949.523	6396.060				
McIntyre, Utah.....	N ₄	1745.028	5725.146				
Near McIntyre, Utah.....	O ₄	1701.272	5581.590				
Jericho, Utah.....	P ₄	1660.212	5446.879				
Do.....	Q ₄	1618.851	5311.180				
Near Jericho, Utah.....	R ₄	1593.002	5226.374				
Do.....	S ₄	1565.600	5136.472				
Dyer, Utah.....	T ₄	1549.307	5083.018				
Near Dyer, Utah.....	U ₄	1536.453	5040.846				
Champlin, Utah.....	V ₄	1509.760	4953.271				
Near Lynn Junction, Utah.....	W ₄	1468.042	4816.401				
Do.....	X ₄	1460.818	4792.700				
Do.....	Y ₄	1458.636	4785.541				
Lynn Junction, Utah.....	Z ₄	1458.146	4783.934				
Near Lynn Junction, Utah.....	A ₅	1456.747	4779.344				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Kara, Wyo.....	Kr.....	1324.364	4345.018	Ranchester, Wyo.....	U. S. G. S. 3788.....	1155.547	3791.157
Near Kara, Wyo.....	Lr.....	1327.323	4354.725	Do.....	Ranchester south-east base A (U. S. G. S.)	1155.571	3791.236
Near Moorcroft, Wyo.....	Mr.....	1334.270	4377.517	Do.....	U. S. G. S. 3751.....	1146.024	3759.914
Do.....	Nr.....	1305.468	4283.023	Near Ranchester, Wyo.....	U. S. G. S. 3698.....	1130.049	3707.502
Moorcroft, Wyo.....	Or.....	1282.278	4206.940	Near Monarch, Wyo.....	U. S. G. S. 3660.....	1118.371	3669.189
Do.....	Pr.....	1282.255	4206.865	Do.....	Za.....	1118.533	3669.720
Do.....	Qr.....	1280.208	4200.149	Alger, Wyo.....	Aa.....	1107.647	3621.111
Near Moorcroft, Wyo.....	Rr.....	1267.306	4157.820	Near Dietz, Wyo.....	Ba.....	1104.687	3624.294
Do.....	Sr.....	1267.127	4157.232	Near Sheridan, Wyo.....	U. S. G. S. 3682.....	1125.228	3691.685
Near Wessex, Wyo.....	Ts.....	1282.946	4209.132	Do.....	Ca.....	1133.019	3717.246
Wessex, Wyo.....	Ur.....	1285.724	4218.246	Sheridan, Wyo.....	Astro.....	1138.097	3733.907
Rozet, Wyo.....	Vr.....	1305.562	4283.331	Do.....	Da.....	1141.413	3744.786
Near Rozet, Wyo.....	Wr.....	1328.548	4353.745	Do.....	U. S. G. S. 3738.....	1142.175	3747.286
Minturn, Wyo.....	Xr.....	1340.204	4396.986	Do.....	Ea.....	1144.558	3755.104
Near Gillette, Wyo.....	Yr.....	1356.253	4449.640	Wakely, Wyo.....	Fa.....	1143.312	3751.016
Gillette, Wyo.....	Zr.....	1384.298	4541.651	Arno, Wyo.....	Ga.....	1150.753	3775.429
Do.....	As.....	1385.907	4546.930	Near Verona, Wyo.....	Ha.....	1173.488	3850.019
Do.....	Bs.....	1385.033	4544.062	Verona, Wyo.....	Ia.....	1222.660	4011.344
Near Gillette, Wyo.....	Cs.....	1422.118	4665.732	Ulm, Wyo.....	Ja.....	1354.028	4442.340
Sparta, Wyo.....	Ds.....	1446.990	4747.333	Near Ulm, Wyo.....	Ka.....	1301.329	4269.444
Oriva, Wyo.....	Es.....	1417.624	4650.988	Near Clearmont, Wyo.....	La.....	1217.442	3994.224
Do.....	Fs.....	1414.606	4641.086	Clearmont, Wyo.....	Ma.....	1194.744	3919.756
Near Oriva, Wyo.....	Gs.....	1405.703	4611.877	Do.....	Na.....	1194.972	3920.504
Kier, Wyo.....	Ha.....	1352.967	4438.859	Big Corral, Wyo.....	Oa.....	1158.251	3800.028
Near Felix, Wyo.....	Is.....	1311.201	4301.832				
Felix, Wyo.....	Js.....	1295.242	4249.473				
Do.....	Ka.....	1290.774	4234.814				
Near Felix, Wyo.....	Ls.....	1251.018	4104.382				
Echeta, Wyo.....	Ms.....	1244.061	4081.557	Rising, Cal.....	Is.....	735.380	2412.659
Do.....	Ns.....	1243.231	4078.834	Near Homer, Cal.....	Je.....	610.387	2002.578
Near Echeta, Wyo.....	Os.....	1217.989	3996.019	Ibis, Cal.....	Ka.....	443.116	1453.790
Croton, Wyo.....	Ps.....	1205.175	3953.978	Near Java, Cal.....	La.....	347.803	1141.083
Do.....	Qa.....	1207.222	3960.694	Do.....	Ma.....	299.178	981.553
Near Lariat, Wyo.....	Rail A.....	1188.801	3900.258	Hartoum, Cal.....	Na.....	225.624	740.235
Lariat, Wyo.....	Ra.....	1182.866	3880.786	Needles, Cal.....	Os.....	147.113	482.653
Arvada, Wyo.....	Sa.....	1114.209	3655.534	Do.....	Pa.....	147.574	484.166
Do.....	Ta.....	1113.439	3653.008	Do.....	Qa.....	148.717	487.916
Do.....	Us.....	1113.996	3654.835	Do.....	Needles, Astro.....	153.469	503.506
Kendrick, Wyo.....	Va.....	1179.360	3869.284	Do.....	A Bart.....	168.360	552.361
Cadiz, Wyo.....	Wa.....	1138.026	3733.674	Near Needles, Cal.....	Ra.....	145.034	475.832
				Do.....	U. S. G. S. 473.....	144.473	473.992
				Do.....	Sa.....	142.892	468.805
Huntley, Mont.....	U. S. R. S. 4.....	921.546	3023.439	Near Beal, Cal.....	Ta.....	141.049	462.758
Near Huntley, Mont.....	U. S. R. S. 5.....	919.800	3017.710	Do.....	Ua.....	144.688	474.697
Do.....	U. S. R. S. 6.....	918.543	3013.586	Do.....	Va.....	153.778	504.520
Do.....	U. S. R. S. 7.....	917.638	3010.617	Topock, Ariz.....	U. S. G. S. 504.....	153.855	504.772
Do.....	U. S. R. S. 8.....	919.658	3017.245	Do.....	A U. S. G. S. Topog.....	154.015	505.298
Near Ballantine, Mont.....	U. S. R. S. 9.....	917.744	3010.965	Do.....	A.....	153.831	504.694
Do.....	U. S. R. S. 10.....	918.240	3012.592	Near Topock, Ariz.....	B.....	161.613	530.225
Do.....	U. S. R. S. 11.....	915.214	3002.665	Do.....	C.....	171.963	564.182
Do.....	Et.....	909.370	2983.491	Near Powell, Ariz.....	D.....	214.530	703.838
Ballantine, Mont.....	U. S. G. S. 2982.....	914.371	2999.890	Powell, Ariz.....	U. S. G. S. 762.....	232.411	762.502
Near Ballantine, Mont.....	U. S. R. S. 12.....	916.016	3005.296	Franconia, Ariz.....	U. S. G. S. 1101.....	335.529	1100.815
Do.....	U. S. R. S. 13.....	925.901	3037.727	Near Franconia, Ariz.....	E.....	380.892	1249.643
Do.....	U. S. R. S. 14.....	924.557	3033.317	Do.....	F.....	386.178	1266.986
Do.....	U. S. R. S. 15.....	923.502	3029.856	Do.....	G.....	386.237	1267.179
Near Anita, Mont.....	U. S. R. S. 16.....	924.517	3033.186	Do.....	H.....	391.074	1283.048
Anita, Mont.....	U. S. G. S. 3056.....	930.524	3052.894	Near Haviland, Ariz.....	I.....	405.578	1330.633
Near Anita, Mont.....	Fr.....	922.859	3027.747	Do.....	J.....	458.166	1503.166
Do.....	G.....	920.650	3020.499	Do.....	K.....	467.363	1533.340
Corinth, Mont.....	U. S. G. S. 3144.....	940.310	3085.000	Do.....	L.....	486.304	1595.482
Toluca, Mont.....	U. S. G. S. 3303.....	989.018	3244.803	Near Yuca, Ariz.....	M.....	501.914	1646.696
Near Toluca, Mont.....	Hy.....	953.250	3127.454	Do.....	N.....	515.915	1692.631
Do.....	Ir.....	944.014	3097.153	Do.....	O.....	532.149	1745.892
Near Hardin, Mont.....	Jr.....	897.171	2943.468	Yuca, Ariz.....	P.....	550.873	1807.322
Do.....	U. S. G. S. 2989.....	892.780	2929.062	Near Yuca, Ariz.....	Q.....	555.870	1823.717
Hardin, Mont.....	Kr.....	884.679	2902.452	Do.....	R.....	589.415	1933.772
Near Hardin, Mont.....	Lr.....	882.882	2896.589	Near Kaster, Ariz.....	S.....	694.731	2279.297
Do.....	Mr.....	882.000	2896.648	Near Drake, Ariz.....	T.....	767.074	2516.642
Do.....	Nr.....	882.404	2895.020	Drake, Ariz.....	U.....	795.130	2608.689
Dunmore, Mont.....	Or.....	903.513	2964.276	Near Drake, Ariz.....	V.....	806.598	2646.314
Near Dunmore, Mont.....	Pr.....	908.557	2980.824	Do.....	W.....	822.814	2699.516
Do.....	Qr.....	917.267	3009.400	Hancock, Ariz.....	X.....	838.821	2752.032
Crow Agency, Mont.....	Rr.....	925.545	3036.559	Near McConico, Ariz.....	Y.....	883.690	2899.239
Near Crow Agency, Mont.....	Sr.....	926.231	3038.810	Near Kingman, Ariz.....	Z.....	984.289	3229.288
Do.....	Ts.....	932.386	3059.003	Kingman, Ariz.....	Ai.....	1018.272	3340.781
Garryowen, Mont.....	Ur.....	951.280	3120.991	Do.....	Bi.....	1014.971	3329.951
Near Garryowen, Mont.....	Vr.....	962.282	3157.087	Berry, Ariz.....	Ci.....	1028.792	3375.295
Near Ionia, Mont.....	Wr.....	989.321	3245.797	Near Hualapai, Ariz.....	Di.....	995.510	3266.103
Ionia, Mont.....	Xr.....	998.489	3275.876	Hualapai, Ariz.....	Ei.....	1005.573	3299.117
Near Lodgegrass, Mont.....	Yr.....	1020.158	3346.968	Do.....	Fi.....	1011.934	3319.916
Lodgegrass, Mont.....	Zr.....	1024.714	3361.916	Near Hualapai, Ariz.....	Gi.....	1022.319	3354.058
Near Lodgegrass, Mont.....	Aa.....	1026.993	3369.393	Do.....	Hi.....	1042.371	3419.846
Near Little Horn, Mont.....	Ba.....	1067.228	3501.397	Antares, Ariz.....	Ii.....	1098.979	3605.567
Near Wyola, Mont.....	Ca.....	1096.576	3597.683	Near Hackberry, Ariz.....	Ji.....	1083.732	3555.544
Wyola, Mont.....	Da.....	1131.589	3712.555	Do.....	Ki.....	1080.281	3544.222
Do.....	Ea.....	1129.337	3705.166	Hackberry, Ariz.....	Li.....	1083.227	3553.887
Near Aberdeen, Mont.....	Fa.....	1186.711	3893.401	Near Hackberry, Ariz.....	Mi.....	1094.740	3591.659
Aberdeen, Mont.....	Ga.....	1205.161	3953.932	Tinnaka, Ariz.....	Ni.....	1164.473	3820.442
In Montana near Parkman, Wyo.....	Ha.....	1246.487	4089.516	Crozier, Ariz.....	Oi.....	1209.762	3969.028
Parkman, Wyo.....	U. S. G. S. 4292.....	1311.103	4301.510	Near Crozier, Ariz.....	Pi.....	1256.876	4123.601
Ohlman, Wyo.....	U. S. G. S. 4138.....	1284.162	4147.505	Near Truxton, Ariz.....	Qi.....	1277.354	4190.786
Near Ranchester, Wyo.....	U. S. G. S. 4011.....	1223.591	4014.398	Near Cheokee, Ariz.....	Ri.....	1385.752	4546.421
				Near Peach Springs, Ariz.....	Si.....	1405.026	4600.659

* Probably moved by the Atchison, Topeka & Santa Fe Railway in 1911.

† Probably destroyed.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Peach Springs, Ariz.	T ₁	1459.325	4787.802	Near Aztec, Ariz.	K ₁	1563.002	5127.949
Nelson, Ariz.	U ₁	1559.394	5116.112	Do.	L ₁	1581.530	5188.736
Near Nelson, Ariz.	V ₁	1590.336	5218.283	Do.	M ₁	1583.696	5195.843
Near Yampai, Ariz.	W ₁	1662.277	5453.633	Near Carrizo, Ariz.	N ₁	1590.952	5219.648
Yampai, Ariz.	X ₁	1701.928	5583.742	Near Adamana, Ariz.	O ₁	1607.789	5274.888
Near Yampai, Ariz.	Y ₁	1644.828	5396.407	Adamana, Ariz.	P ₁	1614.676	5297.482
Near Pica, Ariz.	Z ₁	1587.973	5209.875	Near Adamana, Ariz.	Q ₁	1626.104	5334.976
Do.	A ₂	1581.846	5189.773	Near Pinta, Ariz.	R ₁	1664.974	5462.502
Near Audley, Ariz.	B ₂	1578.096	5177.470	Do.	S ₁	1672.541	5487.329
Audley, Ariz.	C ₂	1570.503	5152.559	Do.	T ₁	1685.721	5530.570
Near Audley, Ariz.	D ₂	1568.209	5145.032	Do.	U ₁	1701.938	5583.775
Near Chino, Ariz.	E ₂	1612.664	5290.882	Near Navajo, Ariz.	V ₁	1702.250	5584.798
Do.	F ₂	1619.586	5313.591	Do.	W ₁	1708.481	5605.241
Near Seligman, Ariz.	G ₂	1594.083	5229.921	Do.	X ₁	1731.275	5680.025
Do.	H ₂	1592.746	5225.534	Near Chambers, Ariz.	Y ₁	1744.954	5724.902
Seligman, Ariz.	I ₂	1597.582	5241.401	Chambers, Ariz.	Z ₁	1752.615	5750.038
Near Pan, Ariz.	J ₂	1665.972	5465.777	Near Sanders, Ariz.	A ₂	1776.240	5927.547
Near Crookton, Ariz.	K ₂	1710.997	5613.496	Sanders, Ariz.	B ₂	1777.138	5930.490
Gleed, Ariz.	L ₂	1654.279	5427.414	Near Sanders, Ariz.	C ₂	1784.940	5956.094
Near Pineveta, Ariz.	M ₂	1557.210	5108.947	Near Houck, Ariz.	D ₂	1808.434	5933.171
Do.	N ₂	1534.486	5034.393	Do.	E ₂	1811.578	5943.486
Near Ash Fork, Ariz.	O ₂	1536.149	5039.849	Houck, Ariz.	F ₂	1815.926	5957.750
Ash Fork, Ariz.	U. S. G. S. 5141.	1566.512	5139.464	Near Allantown, Ariz.	G ₂	1854.216	6081.373
Do.	P ₂	1569.398	5148.933	Near Lupton, Ariz.	H ₂	1870.786	6137.737
Near Ash Fork, Ariz.	U. S. G. S. 5134.	1564.440	5132.667	Do.	I ₂	1875.460	6153.071
Near Holmes, Ariz.	U. S. G. S. 5446.	1659.457	5444.401	Near Manuelito, N. Mex.	A ₂	1891.744	6225.107
Do.	Q ₂	1688.270	5538.933	Do.	B ₂	1905.926	6253.025
Near Fairview, Ariz.	U. S. G. S. 5713.	1740.956	5711.787	Do.	C ₂	1909.332	6264.200
Fairview, Ariz.	U. S. G. S. 5964.	1809.222	5935.756	Do.	D ₂	1919.826	6298.629
Near Fairview, Ariz.	R ₂	1824.088	5984.529	Near Defiance, N. Mex.	E ₂	1938.811	6380.915
Do.	S ₂	1847.314	6060.729	Near West Yard, N. Mex.	F ₂	1968.197	6457.326
Do.	T ₂	1885.711	6186.704	Gallup, N. Mex.	G ₂	1983.181	6506.486
Near McLellan, Ariz.	U ₂	1922.633	6307.839	Near Gallup, N. Mex.	H ₂	1995.748	6547.716
McLellan, Ariz.	V ₂	1957.985	6423.822	Do.	I ₂	2001.438	6566.385
Near McLellan, Ariz.	U. S. G. S. 6568.	2001.584	6566.863	Near Zuni, N. Mex.	J ₂	2003.474	6573.064
Near Supai, Ariz.	W ₂	2104.556	6904.697	Do.	K ₂	2021.500	6632.205
Near Williams, Ariz.	X ₂	2121.413	6980.002	Wingate, N. Mex.	L ₂	2054.301	6739.819
Williams, Ariz.	U. S. G. S. 6770.	2067.258	6782.329	Near Perea, N. Mex.	M ₂	2115.481	6940.540
Do.	Y ₂	2062.437	6766.512	Guam, N. Mex.	N ₂	2133.209	6998.703
Near Williams, Ariz.	Z ₂	2105.394	6907.447	Near Guam, N. Mex.	O ₂	2169.245	7116.931
Do.	U. S. G. S. 6952.	2118.566	6950.662	Near Gonzales, N. Mex.	P ₂	2183.606	7164.048
Do.	U. S. G. S. 6930.	2111.942	6928.930	Gonzales, N. Mex.	Q ₂	2210.739	7257.695
Near Davern, Ariz.	U. S. G. S. 6953.	2119.034	6952.197	Near Gonzales, N. Mex.	R ₂	2218.149	7281.149
Chalender, Ariz.	U. S. G. S. 6869.	2093.191	6867.411	Thoreau, N. Mex.	S ₂	2174.184	7133.135
Near Chalender, Ariz.	A ₃	2091.689	6862.483	Near Thoreau, N. Mex.	T ₂	2152.934	7063.418
Do.	U. S. G. S. 6852.	*2087.986	6850.333	Near Chaves, N. Mex.	U ₂	2125.171	6972.332
Near Maine, Ariz.	B ₃	2134.256	7002.138	Near Baca, N. Mex.	V ₂	2082.720	6833.057
Maine, Ariz.	U. S. G. S. 7086.	2159.522	7085.032	Do.	W ₂	2070.318	6792.368
Near Maine, Ariz.	U. S. G. S. 7178.	2187.349	7176.328	Do.	X ₂	2057.675	6738.889
Near Arey, Ariz.	U. S. G. S. 7193.	2192.122	7191.987	Near Bluewater, N. Mex.	Y ₂	2049.248	6723.241
Near Bellemont, Ariz.	U. S. G. S. 7131.	2173.130	7129.677	Do.	Z ₂	2045.719	6711.663
Do.	C ₃	2173.526	7130.976	Do.	A ₃	2008.467	6582.445
Do.	U. S. G. S. 7186.	2189.880	7184.632	Near Toltec, N. Mex.	B ₃	1989.918	6528.589
Near Riordan, Ariz.	U. S. G. S. 7273.	2216.550	7272.131	Near Grants, N. Mex.	C ₃	1984.282	6516.660
Near Agassiz, Ariz.	U. S. G. S. 7091.	2160.814	7089.277	Grants, N. Mex.	D ₃	1970.928	6446.280
Do.	D ₃	2150.386	7055.058	Near Grants, N. Mex.	E ₃	1967.530	6455.138
Flagstaff, Ariz.	U. S. G. S. 6907.	2104.810	6905.530	Near Horace, N. Mex.	F ₃	1943.580	6376.562
Do.	E ₃	2102.963	6899.471	Do.	G ₃	1917.551	6291.165
Near Flagstaff, Ariz.	U. S. G. S. 6844.	2084.559	6839.061	Near McCartys, N. Mex.	H ₃	1894.866	6216.707
Do.	U. S. G. S. 6843.	2085.166	6841.082	Do.	I ₃	1883.889	6200.772
Near Cosnino, Ariz.	F ₃	1966.444	6451.575	McCartys, N. Mex.	J ₃	1879.092	6195.418
Winona, Ariz.	G ₃	1899.717	6232.655	Near Alaska, N. Mex.	K ₃	1845.685	6055.488
Near Winona, Ariz.	H ₃	1849.604	6068.242	Do.	L ₃	1825.149	5988.010
Near Angell, Ariz.	I ₃	1767.069	5797.459	Near Cubero, N. Mex.	M ₃	1807.230	5929.221
Near Hibbard, Ariz.	J ₃	1701.705	5583.010	Do.	N ₃	1794.550	5887.621
Do.	K ₃	1699.870	5576.990	Near Laguna, N. Mex.	O ₃	1785.586	5888.210
Do.	L ₃	1672.074	5485.796	Do.	P ₃	1777.633	5832.118
Near Canyon Diablo, Ariz.	M ₃	1659.697	5445.189	Laguna, N. Mex.	Q ₃	1767.015	5797.282
Do.	N ₃	1655.104	5430.120	Do.	R ₃	1749.438	5739.615
Do.	O ₃	1655.125	5430.189	Near Laguna, N. Mex.	S ₃	1742.006	5715.231
Near Sunshine, Ariz.	P ₃	1631.900	5353.992	Do.	T ₃	1720.742	5665.153
Do.	Q ₃	1630.389	5349.035	El Rito, N. Mex.	U ₃	1715.303	5627.623
Do.	R ₃	1612.731	5291.102	Near El Rito, N. Mex.	V ₃	1711.929	5616.554
Do.	S ₃	1572.445	5158.930	Near Armijo, N. Mex.	W ₃	1683.656	5523.795
Near Dennison, Ariz.	T ₃	1537.976	5045.843	Do.	X ₃	1681.769	5517.604
Do.	U ₃	1527.648	5011.958	Suwanee, N. Mex.	Y ₃	1661.336	5450.506
Near Winslow, Ariz.	V ₃	1496.110	4875.680	Near Suwanee, N. Mex.	Z ₃	1628.412	5342.548
Do.	W ₃	1498.857	4917.500	Near Garcia, N. Mex.	A ₄	1613.126	5292.398
Winslow, Ariz.	X ₃	1479.840	4855.109	Do.	B ₄	1583.538	5195.325
Near Winslow, Ariz.	Y ₃	1482.042	4862.333	Do.	C ₄	1572.135	5157.913
Do.	Z ₃	1481.980	4862.129	Near Rio Puerco, N. Mex.	D ₄	1553.752	5097.601
Near Hobson, Ariz.	A ₄	1481.999	4888.766	Do.	E ₄	1538.747	5048.372
Near Hardy, Ariz.	B ₄	1501.599	4926.496	Near Pavo, N. Mex.	F ₄	1558.709	5113.865
Near Manila, Ariz.	C ₄	1511.663	4959.514	Do.	G ₄	1579.990	5183.683
Near Joseph City, Ariz.	D ₄	1521.550	4991.952	Do.	H ₄	1584.533	5198.589
Do.	E ₄	1527.442	5011.282	Near Sandia, N. Mex.	I ₄	1622.203	5322.178
Near Penzance, Ariz.	F ₄	1536.214	5040.062	Do.	J ₄	1581.730	5189.393
Do.	G ₄	1538.663	5048.097	Near Manzana, N. Mex.	K ₄	1558.431	5112.952
Near Holbrook, Ariz.	H ₄	1542.302	5060.036	Do.	L ₄	1546.532	5073.914
Holbrook, Ariz.	I ₄	1549.426	5083.408	Near Isleta, N. Mex.	M ₄	1519.955	4986.719
Near Holbrook, Ariz.	J ₄	1556.278	5105.888	Do.	U. S. G. S. 4891.	1481.932	4891.072

* Elevation as moved to the south abutment, 2087.992 meters or 6850.354 feet.

† According to a letter, dated April 21, 1910, from Mr. H. C. Phillips, chief engineer of the Atchison, Topeka & Santa Fe Railway Co., the position of this bench mark has been changed, the new elevation being 1479.865 meters or 4855.189 feet.

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Isleta, N. Mex.	N ₂	1492.820	4897.694	Near Fort Worth, Tex.	E ₁₀	175.614	576.160
Near Isleta, N. Mex.	O ₂	1494.056	4901.749	Near Benbrook, Tex.	F ₁₀	189.979	623.290
Do.	U. S. G. S. 4902.	1494.056	4901.749	Benbrook, Tex.	G ₁₀	201.982	662.669
Do.	U. S. G. S. 4904.	1494.750	4904.026	Near Benbrook, Tex.	H ₁₀	239.965	787.285
Near Albuquerque, N. Mex.	U. S. G. S. 4928.	1502.078	4928.068	Iona, Tex.	I ₁₀	298.797	980.303
Do.	U. S. G. S. 4932.	1503.115	4931.470	Aledo, Tex.	J ₁₀	270.678	888.040
Albuquerque, N. Mex.	P ₂	1510.907	4957.034	Do.	K ₁₀	271.892	892.032
Do.	U. S. G. S. 4954.	1509.739	4953.202	Near Aledo, Tex.	L ₁₀	245.637	805.894
Do.	Albuquerque Astro.	1520.300	4987.851	Do.	M ₁₀	249.345	818.059
Do.	U. S. G. S. 4951.	1509.026	4950.863	Near Anneta, Tex.	N ₁₀	261.192	856.927
Fort Reno, Okla.	A ₂	425.350	1395.502	Earls, Tex.	O ₁₀	274.745	901.392
Calumet, Okla.	B ₂	419.559	1376.503	Near Earls, Tex.	P ₁₀	276.192	906.140
Near Calumet, Okla.	C ₂	440.236	1444.341	Near Weatherford, Tex.	Q ₁₀	285.976	938.240
Geary, Okla.	D ₂	409.428	1340.115	Weatherford, Tex.	R ₁₀	301.666	989.716
Do.	E ₂	472.411	1549.901	Do.	S ₁₀	320.789	1052.456
Do.	F ₂	482.624	1583.409	Near Weatherford, Tex.	T ₁₀	308.128	1010.917
Do.	G ₂	484.752	1590.391	Do.	U ₁₀	319.776	1049.131
Near Geary, Okla.	H ₂	435.961	1430.315	Lambert, Tex.	V ₁₀	347.342	1139.571
Do.	I ₂	428.992	1407.452	Near Millsap, Tex.	W ₁₀	353.079	1158.393
Bridgeport, Okla.	J ₂	434.597	1425.840	Millsap, Tex.	X ₁₀	295.369	969.056
Near Bridgeport, Okla.	K ₂	435.531	1428.904	Near Millsap, Tex.	Y ₁₀	250.534	821.960
McCool, Okla.	L ₂	440.231	1444.423	Bennetts, Tex.	Z ₁₀	229.805	753.952
Near Hydro, Okla.	M ₂	447.784	1469.105	Near Brazos, Tex.	A ₁₁	229.659	753.473
Hydro, Okla.	N ₂	474.721	1557.480	Do.	B ₁₁	248.068	813.870
Do.	O ₂	453.856	1489.025	Brazos, Tex.	C ₁₁	238.862	783.667
Near Hydro, Okla.	P ₂	456.479	1497.631	Near Santo, Tex.	D ₁₁	246.326	808.155
Near Weatherford, Okla.	Q ₂	477.503	1563.608	Do.	E ₁₁	239.974	787.315
Weatherford, Okla.	R ₂	501.674	1645.909	Santo, Tex.	F ₁₁	245.361	804.989
Do.	S ₂	505.846	1659.596	Near Santo, Tex.	G ₁₁	250.686	822.459
Near Weatherford, Okla.	T ₂	516.341	1694.029	Judd, Tex.	H ₁₁	268.527	880.993
Do.	U ₂	525.375	1723.668	Near Gordon, Tex.	I ₁₁	278.574	913.955
Do.	V ₂	548.423	1799.294	Gordon, Tex.	J ₁₁	284.829	934.476
Near Indianapolis, Okla.	W ₂	511.460	1678.015	Near Mingus, Tex.	K ₁₁	294.819	967.252
Indianapolis, Okla.	X ₂	507.850	1666.172	Mingus, Tex.	L ₁₁	291.388	955.996
Near Indianapolis, Okla.	Y ₂	466.360	1530.049	Near Mingus, Tex.	M ₁₁	292.031	958.105
Near Clinton, Okla.	Z ₂	454.237	1490.374	Strawn, Tex.	N ₁₁	290.617	953.466
Clinton, Okla.	A ₃	462.436	1517.175	Do.	O ₁₁	303.560	995.930
Do.	B ₃	477.163	1565.402	Near Strawn, Tex.	P ₁₁	304.030	997.472
Do.	C ₃	477.404	1566.283	Do.	Q ₁₁	317.522	1041.737
Near Clinton, Okla.	D ₃	456.109	1496.417	Near Wiles, Tex.	R ₁₁	328.052	1076.284
Do.	E ₃	471.643	1547.382	Wiles, Tex.	S ₁₁	344.531	1130.349
Near Parkersburg, Okla.	F ₃	470.878	1544.872	Near Wiles, Tex.	T ₁₁	354.284	1162.347
Parkersburg, Okla.	G ₃	464.737	1524.725	Near Tiffin, Tex.	U ₁₁	361.966	1187.550
Near Parkersburg, Okla.	H ₃	481.039	1578.208	Tiffin, Tex.	V ₁₁	400.667	1314.522
Foss, Okla.	I ₃	495.505	1625.669	Ranger, Tex.	W ₁₁	426.448	1399.105
Do.	J ₃	500.146	1640.896	Do.	X ₁₁	441.791	1449.443
Do.	K ₃	496.385	1628.559	Near Ranger, Tex.	Y ₁₁	440.123	1443.970
Near Foss, Okla.	L ₃	535.883	1758.153	Do.	Z ₁₁	446.498	1464.886
Canute, Okla.	M ₃	580.110	1903.244	Olden, Tex.	A ₁₂	446.947	1466.359
Near Canute, Okla.	N ₃	592.680	1944.484	Near Eastland, Tex.	B ₁₂	476.087	1561.962
Near Elk City, Okla.	O ₃	592.186	1942.854	Eastland, Tex.	C ₁₂	455.250	1493.599
Elk City, Okla.	P ₃	583.499	1914.255	Near Eastland, Tex.	D ₁₂	435.950	1430.279
Do.	Q ₃	587.136	1921.295	Lem, Tex.	E ₁₂	446.315	1464.285
Do.	R ₃	588.600	1931.098	Clisco, Tex.	F ₁₂	458.234	1503.389
Near Elk City, Okla.	S ₃	637.718	2092.246	Do.	G ₁₂	495.940	1627.096
Meritt, Okla.	T ₃	622.231	2051.242	Near Clisco, Tex.	H ₁₂	493.725	1619.829
Doxey, Okla.	U ₃	560.222	1837.995	Near Dothan, Tex.	I ₁₂	504.774	1656.079
Do.	V ₃	560.075	1837.513	Do.	Lamb Ref. Mark.	534.578	1753.862
Near Sayre, Okla.	W ₃	560.713	1839.606	Dothan, Tex.	J ₁₂	493.305	1618.451
Do.	X ₃	554.116	1817.933	Near Putnam, Tex.	K ₁₂	478.727	1570.623
Sayre, Okla.	Y ₃	550.807	1807.106	Putnam, Tex.	L ₁₂	458.631	1603.117
Do.	Z ₃	551.865	1810.577	Do.	M ₁₂	490.095	1607.920
Near Sayre, Okla.	A ₄	562.310	1844.845	Near Putnam, Tex.	N ₁₂	459.069	1506.129
Hext Ranch, Okla.	B ₄	588.428	1930.534	Chatauga, Tex.	O ₁₂	465.011	1525.624
Near Erick, Okla.	C ₄	617.075	2024.521	Near Chatauga, Tex.	P ₁₂	485.215	1591.910
Erick, Okla.	D ₄	625.116	2061.400	Near Baird, Tex.	Q ₁₂	497.437	1632.008
Do.	E ₄	628.332	2061.453	Baird, Tex.	R ₁₂	523.822	1718.573
Near Erick, Okla.	F ₄	616.333	2022.086	Do.	S ₁₂	525.736	1724.852
Texola, Okla.	G ₄	654.511	2147.342	Near Baird, Tex.	T ₁₂	580.226	1903.625
Do.	H ₄	655.755	2151.423	Clyde, Tex.	U ₁₂	605.654	1987.050
Benonine, Tex.	I ₄	653.998	2145.658	Near Clyde, Tex.	V ₁₂	612.299	2008.852
Fuller, Tex.	J ₄	665.989	2184.999	Elmdale, Tex.	W ₁₂	543.403	1782.815
Near Shamrock, Tex.	K ₄	700.433	2298.004	Abilene, Tex.	X ₁₂	522.001	1712.598
Shamrock, Tex.	L ₄	711.034	2332.784	Do.	Y ₁₂	525.969	1725.617
Do.	M ₄	713.864	2342.068	Do.	Z ₁₂	525.690	1724.702
Near Shamrock, Tex.	N ₄	730.020	2395.074	Near Abilene, Tex.	A ₁₃	524.107	1719.508
Lela (formerly Story), Tex.	O ₄	735.617	2413.436	Do.	B ₁₃	525.118	1722.825
Near Ramsdell, Tex.	P ₄	759.674	2492.364	Tye, Tex.	C ₁₃	548.452	1799.380
Ramsdell, Tex.	Q ₄	780.015	2559.099	Do.	D ₁₃	546.965	1794.501
Do.	R ₄	781.796	2564.943	Near Merkel, Tex.	E ₁₃	541.447	1776.397
Near Ramsdell, Tex.	S ₄	833.257	2733.777	Merkel, Tex.	F ₁₃	570.120	1870.469
McLean, Tex.	T ₄	871.344	2858.734	Do.	G ₁₃	571.580	1875.259
Do.	U ₄	873.249	2864.985	Do.	H ₁₃	570.506	1871.735
Near McLean, Tex.	V ₄	902.748	2961.765	Near Merkel, Tex.	I ₁₃	566.941	1860.039
Near Albrecht, Tex.	W ₄	916.951	3008.363	Trent, Tex.	J ₁₃	583.651	1914.861
Do.	X ₄	928.571	3046.487	Do.	K ₁₃	584.550	1917.810
Near Albrecht, Tex.	Y ₄	946.118	3104.055	Near Eskota, Tex.	L ₁₃	595.834	1954.832
Rockledge, Tex.	Z ₄	965.493	3167.579	Eskota, Tex.	M ₁₃	590.264	1938.264
Near Jericho, Tex.	A ₅	967.194	3173.203	Near Sweetwater, Tex.	N ₁₃	607.414	1992.824
Jericho, Tex.	B ₅	976.066	3202.310	Do.	O ₁₃	609.881	2000.918
Fort Worth, Tex.	C ₁₀	190.315	624.392	Sweetwater, Tex.	P ₁₃	603.299	2176.174
Near Fort Worth, Tex.	D ₁₀	169.854	557.262	Do.	Q ₁₃	602.539	2174.664
				Near Sweetwater, Tex.	R ₁₃	719.923	2361.947
				Roscoe, Tex.	S ₁₃	727.300	2386.150
				Near Roscoe, Tex.	Patterson A	726.544	2383.670

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Roscoe, Tex.	T ₁₃	727.413	2386.521	Boracho, Tex.	F ₁₇	1358.961	4458.525
Do.	U ₁₃	726.387	2383.154	Near Boracho, Tex.	G ₁₇	1341.317	4400.638
Near Lorraine, Tex.	V ₁₃	704.033	2309.815	Near Plateau, Tex.	H ₁₇	1215.980	4006.802
Lorraine, Tex.	W ₁₃	690.112	2264.142	Do.	I ₁₇	1225.101	4019.352
Do.	X ₁₃	688.178	2257.791	Plateau, Tex.	J ₁₇	1201.556	3942.137
Near Colorado, Tex.	Y ₁₃	675.993	2216.836	Near Plateau, Tex.	U. S. G. S. 3889 Vn	1187.962	3897.505
Colorado, Tex.	Z ₁₃	630.223	2067.653	Do.	K ₁₇	1177.843	3864.307
Do.	A ₁₄	631.413	2071.561	Near Wild Horse, Tex.	U. S. G. S. 3840 Vn	1172.998	3848.411
Do.	B ₁₄	630.905	2070.091	Do.	U. S. G. S. 3826 Vn	1168.586	3832.192
Near Westbrook, Tex.	C ₁₄	636.437	2088.043	Do.	U. S. G. S. 3867 Vn	1181.080	3874.927
Westbrook, Tex.	D ₁₄	639.999	2134.212	Wild Horse, Tex.	L ₁₇	1173.468	3849.533
Near Westbrook, Tex.	E ₁₄	676.730	2220.239	Near Wild Horse, Tex.	U. S. G. S. 3867 Vn	1181.080	3874.927
Iatan, Tex.	F ₁₄	673.961	2211.154	Do.	M ₁₇	1177.459	3863.047
Near Iatan, Tex.	G ₁₄	705.400	2314.320	Near Van Horn, Tex.	N ₁₇	1199.203	3934.385
Near Coahoma, Tex.	H ₁₄	722.321	2369.815	Van Horn, Tex.	O ₁₇	1233.910	4048.283
Coahoma, Tex.	I ₁₄	733.654	2406.997	Do.	U. S. G. S. 4039 Vn	1231.069	4047.462
Near Coahoma, Tex.	J ₁₄	739.053	2424.709	Near Van Horn, Tex.	U. S. G. S. 4239 Vn	1294.620	4247.105
Near Big Spring, Tex.	K ₁₄	731.888	2401.203	Do.	U. S. G. S. 4395 Vn	1342.148	4433.204
Big Spring, Tex.	L ₁₄	732.073	2401.899	Near Allamore, Tex.	U. S. G. S. 4603 Vn	1405.083	4611.812
Do.	M ₁₄	731.927	2401.330	Do.	P ₁₇	1384.910	4541.629
Do.	South End Meridian Line.	741.741	2433.529	Allamore, Tex.	Q ₁₇	1387.186	4551.126
Near Big Spring, Tex.	N ₁₄	736.228	2415.441	Near Allamore, Tex.	R ₁₇	1378.156	4521.500
Do.	O ₁₄	738.566	2423.112	Do.	S ₁₇	1358.912	4458.264
Morita, Tex.	P ₁₄	754.562	2475.592	Near Eagle Flat, Tex.	T ₁₇	1361.059	4465.407
Near Morita, Tex.	Q ₁₄	753.785	2472.977	Eagle Flat, Tex.	U ₁₇	1359.283	4450.581
Near Stanton, Tex.	R ₁₄	784.385	2573.436	Near Eagle Flat, Tex.	V ₁₇	1328.206	4357.620
Stanton, Tex.	S ₁₄	814.888	2673.512	Near Sierra Blanca, Tex.	W ₁₇	1335.060	4380.110
Do.	T ₁₄	811.744	2663.197	La Valley, Tex.	X ₁₇	1339.954	4396.165
Near Stanton, Tex.	U ₁₄	827.074	2713.492	Near Sierra Blanca, Tex.	Y ₁₇	1377.669	4519.902
Do.	Stanton, S. B. A.	821.058	2693.755	Near Sierra Blanca, Tex.	Z ₁₇	1389.156	4557.590
Germania, Tex.	V ₁₄	838.692	2751.609	Etholen, Tex.	A ₁₈	1417.923	4651.969
Near Germania, Tex.	W ₁₄	844.165	2769.565	Near Etholen, Tex.	B ₁₈	1398.971	4589.790
Near Midland, Tex.	X ₁₄	848.916	2785.152	Lasa, Tex.	C ₁₈	1365.263	4479.200
Do.	Y ₁₄	840.134	2756.340	Near Torcer, Tex.	D ₁₈	1326.418	4351.756
Midland, Tex.	Z ₁₄	847.715	2781.212	Torcer, Tex.	E ₁₈	1303.723	4277.308
Do.	A ₁₅	845.571	2774.177	Near Torcer, Tex.	F ₁₈	1287.095	4222.744
Near Midland, Tex.	B ₁₅	866.313	2842.229	Do.	G ₁₈	1235.465	4053.354
Near Warfield, Tex.	Scar A.	880.646	2889.253	Near Finlay, Tex.	H ₁₈	1214.752	3985.399
Warfield, Tex.	C ₁₅	874.611	2869.453	Finlay, Tex.	I ₁₈	1204.154	3950.029
Near Warfield, Tex.	D ₁₅	871.840	2860.361	Tinalja, Tex.	J ₁₈	1177.879	3864.423
Near Odessa, Tex.	E ₁₅	878.658	2882.731	Madden, Tex.	K ₁₈	1179.267	3872.125
Do.	Odessa A.	888.354	2948.039	Nulo, Tex.	L ₁₈	1087.764	3568.772
Odessa, Tex.	F ₁₅	883.371	2898.193	Fort Hancock, Tex.	M ₁₈	1095.558	3594.343
Do.	G ₁₅	884.705	2902.569	Near Fort Hancock, Tex.	N ₁₈	1096.851	3598.586
Near Odessa, Tex.	H ₁₅	897.270	2943.793	Iser, Tex.	O ₁₈	1113.347	3669.110
Douro, Tex.	I ₁₅	939.593	3082.648	Near Polvo, Tex.	P ₁₈	1125.182	3691.535
Near Douro, Tex.	J ₁₅	943.606	3095.814	Do.	Q ₁₈	1123.033	3684.484
Metz, Tex.	K ₁₅	872.570	2862.757	Polvo, Tex.	R ₁₈	1113.099	3651.892
Near Metz, Tex.	L ₁₅	883.892	2899.902	Near Polvo, Tex.	S ₁₈	1000.222	3276.850
Do.	M ₁₅	886.349	2909.539	Do.	U. S. G. S. 3590	1089.258	3573.674
Near Sand Hills, Tex.	N ₁₅	837.235	2746.828	Near Fabens, Tex.	T ₁₈	1095.282	3595.719
Sand Hills, Tex.	O ₁₅	825.380	2707.935	Fabens, Tex.	U ₁₈	1103.501	3620.403
Near Sand Hills, Tex.	P ₁₅	814.566	2672.456	Do.	V ₁₈	1103.156	3619.271
Monahans, Tex.	Q ₁₅	799.338	2622.495	Near Fabens, Tex.	U. S. R. S. 3572.14	1101.760	3514.691
Near Monahans, Tex.	R ₁₅	796.008	2611.766	Near Clint, Tex.	U. S. R. S. 3586.94	1106.253	3629.432
Do.	S ₁₅	794.168	2605.533	Clint, Tex.	U. S. R. S. 3592.95	1108.082	3635.432
Aroya, Tex.	T ₁₅	812.572	2665.914	Do.	W ₁₈	1108.126	3635.577
Near Aroya, Tex.	U ₁₅	808.718	2653.269	Near Clint, Tex.	X ₁₈	1109.134	3638.884
Pyote, Tex.	V ₁₅	798.516	2619.798	Do.	U. S. R. S. 3600.09	1110.257	3642.568
Do.	W ₁₅	800.249	2625.484	Belen, Tex.	Y ₁₈	1115.051	3655.296
Near Pyote, Tex.	X ₁₅	795.051	2608.429	Do.	U. S. G. S. 3614.68	1114.657	3657.004
Quito, Tex.	Y ₁₅	818.840	2683.507	Do.	Z ₁₈	1114.495	3656.472
Near Quito, Tex.	Z ₁₅	812.044	2644.181	Ysleta, Tex.	A ₁₉	1118.552	3669.782
Do.	A ₁₆	810.573	2659.355	Near Ysleta, Tex.	B ₁₉	1122.568	3682.958
Do.	B ₁₆	809.393	2655.461	Alfalfa, Tex.	C ₁₉	1125.659	3693.100
Near Barstow, Tex.	C ₁₆	808.131	2651.343	Near Alfalfa, Tex.	D ₁₉	1127.113	3697.870
Do.	Hays A.	853.060	2798.748	El Paso, Tex.	E ₁₉	1129.605	3706.045
Do.	D ₁₆	781.706	2564.647	Do.	F ₁₉	1129.141	3704.523
Barstow, Tex.	E ₁₆	782.432	2567.029	Do.	G ₁₉	1129.644	3709.454
Near Barstow, Tex.	F ₁₆	782.092	2565.913	Do.	H ₁₉	1129.904	3707.027
Near Pecos, Tex.	G ₁₆	782.557	2567.439	Do.	U. S. G. S. 3698	1131.085	3710.902
Do.	H ₁₆	783.881	2571.793	Do.	U. S. G. S. 365	1130.771	3709.871
Pecos, Tex.	I ₁₆	788.503	2581.947	Do.	U. S. G. S. 365	1130.972	3710.531
Do.	J ₁₆	787.644	2584.129	Do.	City B. M.	1131.239	3711.407
Near Pecos, Tex.	K ₁₆	805.961	2644.224	Near Jericho, Tex.	I ₁₉	972.203	3189.636
Near Hermosa, Tex.	L ₁₆	819.458	2688.505	Boydston, Tex.	J ₁₉	985.022	3231.693
Hermosa, Tex.	M ₁₆	832.237	2730.431	Groom, Tex.	K ₁₉	994.872	3264.010
Near Hermosa, Tex.	N ₁₆	850.054	2788.886	Near Groom, Tex.	L ₁₉	1003.446	3292.139
Near Toyah, Tex.	O ₁₆	868.348	2848.905	Do.	M ₁₉	1007.812	3306.463
Toyah, Tex.	P ₁₆	886.309	2907.832	Lark, Tex.	N ₁₉	1028.184	3373.300
Do.	Q ₁₆	890.129	2922.005	Near Conway, Tex.	O ₁₉	1043.943	3425.003
Do.	R ₁₆	891.415	2924.584	Conway, Tex.	P ₁₉	1053.616	3456.739
Near Toyah, Tex.	S ₁₆	920.199	3018.692	Near Conway, Tex.	Q ₁₉	1057.696	3470.124
Do.	T ₁₆	955.747	3135.647	Yarnall, Tex.	R ₁₉	1074.279	3524.530
Gomez, Tex.	U ₁₆	998.409	3275.613	Near Yarnall, Tex.	S ₁₉	1072.723	3519.425
Near Gomez, Tex.	V ₁₆	1029.637	3378.068	Royal, Tex.	T ₁₉	1096.756	3598.274
Near San Martino, Tex.	W ₁₆	1135.497	3725.377	Near Amarillo, Tex.	U ₁₉	1100.206	3609.593
San Martino, Tex.	X ₁₆	1132.483	3715.488				
Do.	Y ₁₆	1133.339	3714.295				
Near San Martino, Tex.	Z ₁₆	1167.207	3829.412				
Near Kent, Tex.	A ₁₇	1215.515	3987.902				
Do.	B ₁₇	1260.925	4136.885				
Kent, Tex.	C ₁₇	1283.983	4212.544				
Near Kent, Tex.	D ₁₇	1311.597	4303.131				
Do.	E ₁₇	1319.019	4327.481				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Amarillo, Tex.	V ₁₉	1113.779	3654.123	Vaughn, N. Mex.	V ₄	1818.483	5966.140
Do.	W ₁₉	1114.272	3655.741	Near Vaughn, N. Mex.	W ₄	1823.254	5981.792
Amarillo, Tex.	X ₁₉	1117.840	3667.447	Do.	X ₄	1828.931	6000.418
Do.	Y ₁₉	1116.702	3663.713	Tejon, N. Mex.	Y ₄	1856.220	6089.948
Zita, Tex.	Z ₁₉	1112.930	3651.338	Near Carnero, N. Mex.	Z ₄	1883.922	6180.834
Near Zita, Tex.	A ₂₀	1113.594	3653.516	Carnero, N. Mex.	A ₅	1896.543	6222.241
Haney, Tex.	B ₂₀	1109.841	3641.203	Near Encino, N. Mex.	B ₅	1877.454	6159.594
Near Canyon, Tex.	C ₂₀	1095.053	3592.686	Encino, N. Mex.	C ₅	1865.997	6122.025
Canyon, Tex.	D ₂₀	1082.440	3551.306	Near Encino, N. Mex.	D ₅	1878.972	6164.594
Do.	E ₂₀	1090.290	3577.060	Near Negra, N. Mex.	E ₅	1879.908	6167.665
Do.	F ₂₀	1090.404	3577.434	Negra, N. Mex.	F ₅	1889.611	6199.499
Near Canyon, Tex.	G ₂₀	1093.107	3586.302	Near Pedernal, N. Mex.	G ₅	1919.352	6297.074
Lester, Tex.	H ₂₀	1117.813	3667.358	Pedernal, N. Mex.	H ₅	1940.938	6367.894
Umbarger, Tex.	I ₂₀	1147.843	3765.881	Dunmoor, N. Mex.	I ₅	1942.614	6373.393
Near Umbarger, Tex.	J ₂₀	1144.374	3754.500	Near Dunmoor, N. Mex.	J ₅	1931.050	6335.453
Dawn, Tex.	K ₂₀	1156.122	3793.043	Near Lucy, N. Mex.	K ₅	1895.501	6218.823
Near Dawn, Tex.	L ₂₀	1150.682	3775.196	Do.	L ₅	1881.276	6172.153
Joel, Tex.	M ₂₀	1148.220	3767.118	Lucy, N. Mex.	M ₅	1882.545	6176.316
Near Joel, Tex.	N ₂₀	1147.858	3765.931	Near Lucy, N. Mex.	N ₅	1858.455	6097.281
Hereford, Tex.	O ₂₀	1162.046	3812.479	Near Sillo, N. Mex.	O ₅	1854.510	6094.338
Do.	P ₂₀	1165.212	3822.866	Willard, N. Mex.	P ₅	1858.018	6095.847
Do.	Q ₂₀	1164.261	3819.746	Do.	Q ₅	1857.512	6094.187
Near Hereford, Tex.	R ₂₀	1177.518	3863.240	Do.	R ₅	1861.409	6106.973
Summerfield, Tex.	S ₂₀	1199.459	3935.225	Near Willard, N. Mex.	S ₅	1891.647	6206.178
Near Summerfield, Tex.	T ₂₀	1197.516	3928.850	Broncho, N. Mex.	T ₅	1923.751	6311.506
Do.	U ₂₀	1198.874	3933.306	Do.	U ₅	1926.324	6319.948
Black, Tex.	V ₂₀	1217.421	3994.155	Near Mountainair, N. Mex.	V ₅	1946.894	6387.435
Near Friona, Tex.	W ₂₀	1220.450	4004.093	Mountainair, N. Mex.	W ₅	1977.301	6487.195
Friona, Tex.	X ₂₀	1220.957	4005.756	Do.	X ₅	1980.966	6499.219
Near Friona, Tex.	Y ₂₀	1252.429	4109.011	Near Mountainair, N. Mex.	Y ₅	1966.179	6450.706
Parmerton, Tex.	Z ₂₀	1272.994	4176.481	Do.	Z ₅	1930.083	6332.281
Near Parmerton, Tex.	A ₂₁	1258.247	4128.098	Abo, N. Mex.	A ₆	1876.218	6155.559
Bovina, Tex.	B ₂₁	1240.315	4069.267	Near Abo, N. Mex.	B ₆	1872.103	6142.353
Near Bovina, Tex.	C ₂₁	1234.690	4050.812	Do.	C ₆	1822.495	5979.302
Do.	D ₂₁	1245.149	4085.120	Near Scholle, N. Mex.	D ₆	1768.399	5801.822
Wilsey, Tex.	E ₂₁	1270.591	4168.597	Do.	E ₆	1757.798	5767.042
Near Wilsey, Tex.	F ₂₁	1259.565	4132.423	Do.	F ₆	1728.370	5670.494
Texico, N. Mex.	G ₂₁	1264.190	4147.597	Near Sals (Siding), N. Mex.	G ₆	1673.721	5491.200
Do.	H ₂₁	1264.794	4149.578	Sals (Siding), N. Mex.	H ₆	1659.628	5444.963
Near Texico, N. Mex.	I ₂₁	1279.751	4198.650	Becker, N. Mex.	I ₆	1578.898	5180.101
Near Clovis, N. Mex.	J ₂₁	1287.882	4225.326	Do.	J ₆	1577.631	5175.944
Clovis, N. Mex.	U ₂₁	1297.553	4257.055	Near Bodega, N. Mex.	K ₆	1526.583	5008.464
Do.	V ₂₁	1299.295	4262.770	Near Madrone, N. Mex.	L ₆	1498.819	4917.375
Do.	W ₂₁	1301.390	4269.644	Madrone, N. Mex.	M ₆	1481.786	4861.493
Near Clovis, N. Mex.	X ₂₁	1313.103	4308.072	Near Belen, N. Mex.	N ₆	1466.638	4811.795
Near Blacktower, N. Mex.	Y ₂₁	1313.574	4309.617	Do.	O ₆	1465.345	4807.553
Blacktower, N. Mex.	Z ₂₁	1316.613	4319.588	Do.	P ₆	1461.252	4794.124
Do.	A ₂₂	1318.486	4325.733	Belen, N. Mex.	Q ₆	1466.300	4810.686
Near Blacktower, N. Mex.	B ₂₂	1328.525	4358.669	Do.	R ₆	1465.151	4806.916
Do.	C ₂₂	1331.470	4368.331	Near Belen, N. Mex.	U ₆	1465.873	4809.301
Near St. Vrain, N. Mex.	D ₂₂	1340.507	4397.980	Near Los Lunas, N. Mex.	U ₆	1469.799	4822.166
Near Melrose, N. Mex.	E ₂₂	1341.020	4399.663	Do.	U ₆	1473.414	4834.026
Melrose, N. Mex.	F ₂₂	1340.814	4398.987	Do.	U ₆	1475.099	4839.554
Near Melrose, N. Mex.	G ₂₂	1332.242	4370.864	Los Lunas, N. Mex.	S ₆	1480.235	4856.404
Cantara, N. Mex.	H ₂₂	1343.484	4407.747	Do.	U ₆	1479.024	4852.431
Near Krider, N. Mex.	I ₂₂	1321.860	4336.802	Near Los Lunas, N. Mex.	T ₆	1481.910	4861.900
Krider, N. Mex.	J ₂₂	1313.396	4309.033				
Near Krider, N. Mex.	K ₂₂	1305.823	4284.188				
Tolar, N. Mex.	L ₂₂	1282.214	4206.730	Louisville, Ky.	U. S. E. B. M. No. 10(-602 B)	127.146	417.145
Near Tolar, N. Mex.	M ₂₂	1274.747	4182.232	Do.	U. S. E. B. M. 603	126.777	415.935
Taiban, N. Mex.	N ₂₂	1257.594	4125.956	Do.	U. S. E. B. M. 604M	131.175	430.363
Near Taiban, N. Mex.	O ₂₂	1256.400	4122.039	Do.	P. B. M. 604	130.941	429.595
Near La Lande, N. Mex.	P ₂₂	1240.255	4069.070	Do.	Guard Pier	135.454	444.435
La Lande, N. Mex.	Q ₂₂	1254.299	4115.146	Do.	P. B. M. 604A	121.409	398.520
Near Fort Sumner, N. Mex.	R ₂₂	1255.356	4118.614	Do.	P. B. M. 605	122.781	402.824
Do.	S ₂₂	1236.327	4056.183	Do.	P. B. M. 606	124.211	407.514
Fort Sumner, N. Mex.	T ₂₂	1237.162	4058.922	Do.	P. B. M. 607	124.320	407.872
Do.	U ₂₂	1240.520	4069.939	Do.	P. B. M. 607A	122.748	402.716
Near Fort Sumner, N. Mex.	V ₂₂	1235.403	4053.151	Do.	P. B. M. 608	126.778	415.938
Fort Sumner, N. Mex.	U. S. G. S. Ft. Sumner	1233.584	4047.183	Do.	P. B. M. 609	123.388	404.814
Near Fort Sumner, N. Mex.	W ₂₂	1243.462	4079.592	Near Louisville, Ky.	P. B. M. 610	122.379	401.504
Do.	X ₂₂	1246.299	4088.899	Do.	P. B. M. 611	126.377	414.622
Do.	Y ₂₂	1266.197	4164.148	Do.	P. B. M. 612	123.574	405.425
Agudo, N. Mex.	Z ₂₂	1297.880	4258.128	Do.	P. B. M. 613	124.723	409.195
Ricardo, N. Mex.	A ₂₃	1345.408	4414.059	In Kentucky, near Bridgeport, Ind.	P. B. M. 614	124.929	409.872
Near Ricardo, N. Mex.	B ₂₃	1362.207	4469.174	Do.	P. B. M. 614A	129.971	426.412
Evanola, N. Mex.	C ₂₃	1395.849	4579.548	Near Greenwood Landing, Ky.	P. B. M. 615	123.451	405.022
Near Yesso, N. Mex.	D ₂₃	1431.455	4696.365	Greenwood Landing, Ky.	P. B. M. 616	126.361	414.569
Yesso, N. Mex.	E ₂₃	1455.218	4774.328	In Kentucky, near Stewarts Landing, Ind.	P. B. M. 617	126.839	416.138
Do.	F ₂₃	1456.622	4778.934	Near Valley Station, Ky.	P. B. M. 618	126.720	415.748
Largo, N. Mex.	G ₂₃	1514.022	4967.254	Near Johnsonstown, Ky.	P. B. M. 619	125.736	412.518
Near Largo, N. Mex.	H ₂₃	1521.552	4991.958	Near Bethany, Ky.	P. B. M. 620	120.728	396.087
Buchanan, N. Mex.	I ₂₃	1563.154	5128.448	Near Kosmosdale, Ky.	P. B. M. 621	126.641	415.489
Near Buchanan, N. Mex.	J ₂₃	1567.914	5144.064	Do.	P. B. M. 622	123.246	404.348
Do.	K ₂₃	1587.152	5207.181	Do.	P. B. M. 623	123.990	406.791
Cardenas, N. Mex.	L ₂₃	1614.295	5296.200	Kosmosdale, Ky.	P. B. M. 623A	130.269	427.390
Near Cardenas, N. Mex.	M ₂₃	1623.238	5325.573	Do.	P. B. M. 624	126.582	414.004
Duoro, N. Mex.	N ₂₃	1658.032	5439.727	Near Kosmosdale, Ky.	P. B. M. 625	125.189	412.014
Near Duoro, N. Mex.	O ₂₃	1670.448	5480.401	Near West Point, Ky.	P. B. M. 626	121.060	397.778
Do.	P ₂₃	1664.192	5558.362	West Point, Ky.	U. S. G. S. 441	134.342	440.753
Casaus, N. Mex.	Q ₂₃	1712.744	5619.228	Do.	P. B. M. 627	130.283	427.436
Near Casaus, N. Mex.	R ₂₃	1726.158	5663.237	Near West Point, Ky.	P. B. M. 628	125.020	410.171
Iden, N. Mex.	S ₂₃	1772.054	5813.814				
Near Vaughn, N. Mex.	T ₂₃	1793.111	5882.898				
Vaughn, N. Mex.	U ₂₃	1818.101	5964.886				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
In Kentucky, near Evans Landing, Ind.	P. B. M. 629.....	121.827	398.035	In Kentucky, opposite Deer Creek, Ind.	P. B. M. 715.....	120.939	397.829
In Kentucky, near Browns Landing, Ind.	P. B. M. 630.....	120.287	394.642	Do.	P. B. M. 715A.....	120.208	394.581
Do.	P. B. M. 631.....	120.856	396.510	Near Landis Landing, Ky.	P. B. M. 716.....	119.380	391.685
In Kentucky, near Mosquito Creek, Ind.	P. B. M. 632.....	124.593	408.770	Near Hawesville, Ky.	P. B. M. 717.....	118.391	388.421
Near Rock Haven, Ky.	P. B. M. 633.....	123.838	406.202	Do.	P. B. M. 717A.....	119.004	390.432
Do.	P. B. M. 634.....	124.860	409.644	Do.	P. B. M. 718.....	117.553	385.671
Rock Haven, Ky.	P. B. M. 635.....	119.305	391.419	Do.	P. B. M. 719.....	114.712	376.350
Do.	P. B. M. 635A.....	115.696	379.579	Hawesville, Ky.	P. B. M. 720.....	114.642	376.122
Near Rock Haven, Ky.	P. B. M. 636.....	121.990	400.230	Do.	P. B. M. 720A.....	119.037	390.539
Near Dittoes Landing, Ky.	P. B. M. 637.....	125.177	410.684	Near Hawesville, Ky.	U. S. G. S. 422.....	127.973	419.857
Do.	P. B. M. 638.....	120.508	395.366	Do.	P. B. M. 721.....	115.308	378.307
In Kentucky, near Tobacco Landing, Ind.	P. M. G. 639.....	121.978	400.188	Do.	P. B. M. 722.....	115.957	380.437
Near Brandenburg, Ky.	P. B. M. 640.....	122.153	400.765	Beachams Landing, Ky.	P. B. M. 723.....	115.945	380.397
Do.	P. B. M. 641.....	127.458	418.169	In Hancock County, Ky., above Troy, Ind.	P. B. M. 724.....	113.934	373.799
Do.	P. B. M. 642.....	119.835	393.159	Do.	P. B. M. 725.....	115.609	379.295
Brandenburg, Ky.	P. B. M. 643.....	135.920	445.931	In Hancock County, Ky., below Troy, Ind.	P. B. M. 726.....	121.209	397.667
Do.	P. B. M. 643A.....	137.521	451.183	Do.	P. B. M. 727.....	119.140	390.878
Near Brandenburg, Ky.	P. B. M. 644.....	121.503	398.630	Do.	P. B. M. 728.....	115.602	379.271
In Kentucky, near Mauckport, Ind.	P. B. M. 645.....	120.370	394.915	Do.	P. B. M. 728A.....	116.979	383.788
Do.	P. B. M. 646.....	122.881	403.153	Near Lewisport, Ky.	P. B. M. 729.....	115.718	379.651
Do.	P. B. M. 647.....	124.721	409.188	Do.	P. B. M. 730.....	114.333	375.108
Do.	P. B. M. 648.....	120.134	394.140	Do.	P. B. M. 731.....	113.833	373.468
Do.	P. B. M. 651.....	126.042	413.522	Do.	P. B. M. 732.....	116.375	381.807
Near Crecelius, Ky.	P. B. M. 654.....	121.625	399.032	Do.	P. B. M. 733.....	114.650	376.148
Do.	P. B. M. 655.....	127.466	418.195	Lewisport, Ky.	P. B. M. 733A.....	121.504	398.634
Do.	P. B. M. 656.....	121.201	397.640	Do.	P. B. M. 734.....	113.241	371.525
Do.	P. B. M. 657.....	119.027	390.509	Near Lewisport, Ky.	P. B. M. 735.....	118.823	389.838
Near Peckenpaugh, Ky.	P. B. M. 658.....	120.739	396.125	Do.	P. B. M. 736.....	120.972	396.889
In Kentucky, near Leavenworth, Ind.	P. B. M. 660.....	129.243	424.025	Do.	P. B. M. 737.....	117.805	386.500
Do.	P. B. M. 661.....	127.868	419.513	In Kentucky, opposite Grand View, Ind.	P. B. M. 738.....	112.479	369.024
Leavenworth, Ind.	P. B. M. 661A.....	128.076	420.197	Do.	P. B. M. 739.....	112.103	367.791
Do.	High Water 1883.....	130.553	428.324	In Kentucky, near Rockport, Ind.	P. B. M. 740.....	112.764	369.040
Do.	High Water 1884.....	131.011	429.824	Do.	P. B. M. 741.....	117.190	384.480
In Kentucky, near Leavenworth, Ind.	P. B. M. 662.....	120.457	395.199	Do.	P. B. M. 742.....	117.114	384.233
Do.	P. B. M. 663.....	122.125	400.673	Do.	P. B. M. 743.....	114.359	375.291
Near Crecelius, Ky.	P. B. M. 664.....	121.106	397.329	Do.	P. B. M. 744.....	113.298	371.713
Do.	P. B. M. 665.....	121.056	397.166	Do.	P. B. M. 745.....	115.804	379.933
Crecelius, Ky.	P. B. M. 666.....	120.227	394.446	Iceland Landing, Ky.	P. B. M. 746.....	113.320	371.818
Near Crecelius, Ky.	P. B. M. 667.....	112.737	369.872	Near Owensboro, Ky.	P. B. M. 747.....	112.574	369.336
Do.	P. B. M. 668.....	118.766	389.652	Do.	P. B. M. 748.....	113.079	370.994
Near Cedar Branch, Ky.	P. B. M. 669.....	116.765	383.086	Do.	P. B. M. 749.....	107.957	354.190
Do.	P. B. M. 670.....	117.221	384.581	Do.	P. B. M. 750.....	120.582	395.788
Near Wolf Creek, Ky.	P. B. M. 671.....	117.883	386.754	Owensboro, Ky.	P. B. M. 751.....	109.424	359.081
Do.	P. B. M. 672.....	117.834	386.595	Do.	P. B. M. 752.....	120.287	394.043
Do.	P. B. M. 673.....	117.635	385.941	Do.	U. S. G. S. 396.....	118.234	387.000
Do.	P. B. M. 674.....	119.320	391.469	Do.	High Water 1884.....	103.384	339.187
In Kentucky, near Alton, Ind.	P. B. M. 678.....	120.024	393.779	Near Owensboro, Ky.	P. B. M. 753.....	108.202	354.992
Near Concordia, Ky.	P. B. M. 679.....	121.957	400.122	Do.	P. B. M. 754.....	108.923	357.357
Do.	P. B. M. 680.....	124.616	408.843	Do.	P. B. M. 755.....	115.570	379.165
Do.	P. B. M. 681.....	119.001	390.422	Near Little Hurricane Island, Ky.	P. B. M. 756.....	112.719	369.813
Concordia, Ky.	P. B. M. 682.....	116.652	382.716	Do.	P. B. M. 757.....	113.915	373.736
Near Concordia, Ky.	P. B. M. 683.....	123.852	406.338	Do.	P. B. M. 758.....	114.573	375.896
Do.	P. B. M. 684.....	117.469	385.397	Do.	P. B. M. 759.....	110.678	363.117
Do.	P. B. M. 685.....	116.875	383.447	Near French Island, Ky.	P. B. M. 760.....	109.144	358.083
Flint Island, Ky.	P. B. M. 686.....	117.191	384.485	Do.	P. B. M. 761.....	113.657	372.889
Do.	P. B. M. 687.....	117.636	385.943	Do.	P. B. M. 762.....	113.431	372.148
Do.	P. B. M. 687A.....	112.897	370.395	Do.	P. B. M. 763.....	113.811	373.394
Burchs Landing, Ky.	P. B. M. 688.....	117.315	384.890	Do.	P. B. M. 764.....	113.392	372.019
Near Chenault, Ky.	P. B. M. 689.....	119.586	392.342	Do.	P. B. M. 765.....	112.039	367.581
Chenault, Ky.	P. B. M. 690.....	122.360	401.443	Do.	P. B. M. 766.....	108.314	355.361
Near Chenault, Ky.	P. B. M. 691.....	118.898	390.084	Near Carlinburg, Ky.	P. B. M. 767.....	108.624	356.377
Near Lahant, Ky.	P. B. M. 692.....	115.828	380.012	Near Scuffletown, Ky.	P. B. M. 768.....	107.373	352.274
Do.	P. B. M. 693.....	117.627	385.913	Do.	P. B. M. 769.....	108.010	354.364
Near Ammons, Ky.	P. B. M. 694.....	115.823	379.996	Do.	P. B. M. 771.....	113.292	371.692
Do.	P. B. M. 695.....	116.541	382.352	Do.	P. B. M. 773.....	109.386	358.878
Near Stephensport, Ky.	P. B. M. 696.....	120.210	394.389	Near mouth of Green River, Ky.	P. B. M. 777.....	109.802	360.241
Do.	P. B. M. 697.....	126.573	415.264	Do.	P. B. M. 778.....	109.161	358.128
Stephensport, Ky.	P. B. M. 697A.....	116.897	383.519	Do.	P. B. M. 779.....	108.000	354.331
Near Stephensport, Ky.	P. B. M. 698.....	117.420	385.234	In Kentucky, near Evansville, Ind.	P. B. M. 780.....	109.432	359.028
Near Addison, Ky.	P. B. M. 699.....	116.174	381.148	Do.	P. B. M. 781.....	111.968	367.340
Do.	P. B. M. 700.....	120.770	396.225	Do.	P. B. M. 782.....	107.319	352.095
Holt, Ky.	P. B. M. 701.....	121.792	399.580	Do.	P. B. M. 783.....	111.573	366.053
Near Holt, Ky.	P. B. M. 702.....	118.685	389.386	Do.	P. B. M. 784.....	112.048	367.611
Do.	P. B. M. 703.....	116.753	383.048	Do.	P. B. M. 785.....	112.502	369.101
Near Cloverport, Ky.	P. B. M. 704.....	118.261	387.996	Do.	P. B. M. 786.....	111.739	366.596
Do.	P. B. M. 705.....	115.111	377.659	Do.	P. B. M. 787.....	109.326	358.681
Do.	P. B. M. 706.....	116.562	382.422	Do.	P. B. M. 788.....	110.237	361.670
Cloverport, Ky.	P. B. M. 707.....	115.750	379.755	Do.	P. B. M. 789.....	111.714	366.515
Do.	P. B. M. 707A.....	125.825	412.812	Do.	P. B. M. 790.....	107.434	352.474
Do.	High Water 1884.....	126.991	416.637	Evansville, Ind.	High water marks.....	107.834	376.751
Do.	P. B. M. 708.....	126.747	415.835	Do.	U. S. G. S. 394.....	114.905	379.083
Near Cloverport, Ky.	P. B. M. 709.....	116.519	382.279	Do.	P. B. M. 791.....	120.154	394.206
Do.	P. B. M. 710.....	120.493	395.317	Dutch Bend, Ky.	P. B. M. 792.....	110.698	363.181
Near Skillman, Ky.	P. B. M. 711.....	121.441	398.428	Do.	P. B. M. 793.....	108.842	357.002
Do.	P. B. M. 712.....	118.816	389.814	Near Henderson, Ky.	P. B. M. 794.....	107.048	351.201
Do.	P. B. M. 713.....	116.307	381.583	Do.	P. B. M. 794.....	106.888	350.683
Do.	P. B. M. 714.....	114.621	376.051				

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Henderson, Ky.	P. B. M. 795.	107.614	353.065	Near Berry Ferry, Ky.	P. B. M. 888.	98.220	322.243
Do.	P. B. M. 796.	109.914	360.610	Do.	P. B. M. 889.	97.524	319.959
Do.	P. B. M. 797.	107.401	352.364	Do.	P. B. M. 890.	98.497	323.153
Henderson, Ky.	Ref. Point.	103.306	338.929	Do.	P. B. M. 891.	101.779	333.920
Do.	Old B. M.	103.200	338.581	Do.	P. B. M. 892.	96.240	315.747
Do.	High water, 1884.	115.025	377.378	Golconda, Ill.	High Water 1883.	106.451	349.249
Do.	P. B. M. 797A.	114.752	376.483	Do.	High Water 1884.	106.899	350.719
Do.	P. B. M. 798.	118.177	387.718	Near Berry Ferry, Ky.	P. B. M. 893.	97.695	320.522
Near Henderson, Ky.	P. B. M. 799.	107.692	353.319	Do.	P. B. M. 894.	101.262	332.225
Do.	P. B. M. 800.	108.433	355.752	Near Pryors Island, Ky.	P. B. M. 895.	97.821	320.934
Do.	P. B. M. 801.	110.839	363.644	Near Bayou, Ky.	P. B. M. 896.	100.887	330.993
Do.	P. B. M. 802.	110.604	362.872	Do.	P. B. M. 897.	99.678	327.027
Near McDonalds Landing, Ky.	P. B. M. 803.	117.042	383.995	Do.	P. B. M. 898.	96.865	317.799
Do.	P. B. M. 805.	112.466	368.983	Do.	P. B. M. 899.	102.065	334.857
Do.	P. B. M. 806.	110.516	362.585	Do.	P. B. M. 900.	97.109	318.597
Near Cypress Bend, Ky.	P. B. M. 807.	110.422	362.276	Bayou, Ky.	P. B. M. 901.	99.459	326.308
Do.	P. B. M. 808.	107.390	352.329	Near Birdsville, Ky.	P. B. M. 902.	104.650	343.339
Cypress Bend, Ky.	P. B. M. 809.	106.227	348.514	Birdsville, Ky.	P. B. M. 903.	101.234	332.133
In Kentucky, near West Franklin, Ind.	P. B. M. 810.	106.544	349.552	Do.	P. B. M. 903A.	102.335	335.743
Do.	P. B. M. 811.	105.670	346.685	Near Birdsville, Ky.	P. B. M. 904.	96.587	316.886
Near Diamond Island, Ky.	P. B. M. 812.	106.236	348.543	Do.	P. B. M. 905.	95.327	312.753
Do.	P. B. M. 813.	109.017	357.668	Near Smithland, Ky.	P. B. M. 906.	98.835	324.261
Do.	P. B. M. 815.	108.411	355.678	Do.	P. B. M. 907.	99.684	327.047
Do.	P. B. M. 816.	109.431	359.025	Do.	P. B. M. 908.	97.761	320.736
Near Alzey, Ky.	P. B. M. 817.	104.220	341.927	Smithland, Ky.	P. B. M. 909.	97.889	321.158
Do.	P. B. M. 818.	108.192	354.959	Do.	P. B. M. 909A.	102.153	335.147
In Kentucky, near Mount Vernon, Ind.	P. B. M. 819.	109.429	359.019	Near Smithland, Ky.	P. B. M. 910.	97.159	318.763
Do.	P. B. M. 820.	108.807	356.978	Do.	P. B. M. 911.	99.514	326.488
Do.	P. B. M. 821.	109.657	359.765	Do.	P. B. M. 913.	95.992	314.934
Do.	P. B. M. 822.	106.169	348.323	Near Ledbetter, Ky.	P. B. M. 914.	95.990	314.928
Do.	P. B. M. 823.	105.193	345.121	Do.	P. B. M. 915.	98.544	323.307
Do.	P. B. M. 824.	105.592	346.429	Do.	P. B. M. 916.	100.144	328.555
Near Slim Island, Ky.	P. B. M. 825.	103.565	339.780	Do.	P. B. M. 917.	94.793	311.001
Do.	P. B. M. 826.	108.682	356.568	Near Paducah, Ky.	P. B. M. 918.	93.934	308.181
Do.	P. B. M. 827.	107.588	352.979	Do.	P. B. M. 919.	99.352	325.957
Do.	P. B. M. 828.	105.038	344.612	Do.	P. B. M. 920.	98.819	324.208
Do.	P. B. M. 829.	107.140	351.508	Do.	P. B. M. 921.	93.433	306.538
Do.	P. B. M. 830.	104.416	342.570	Do.	P. B. M. 922.	98.750	323.982
Near Uniontown, Ky.	P. B. M. 831.	104.256	342.048	Paducah, Ky.	P. B. M. 923.	99.530	326.542
Do.	P. B. M. 833.	107.847	353.828	Do.	P. B. M. 923A.	91.533	300.303
Do.	P. B. M. 834.	105.735	346.900	Do.	P. B. M. 924.	93.523	306.834
Do.	P. B. M. 835.	101.941	334.451	Near Paducah, Ky.	P. B. M. 925.	95.029	311.774
Do.	P. B. M. 836.	105.006	344.802	Do.	P. B. M. 926.	93.977	308.324
Do.	P. B. M. 837.	104.966	344.375	Do.	P. B. M. 927.	94.359	309.577
Near Wabash Island, Ky.	P. B. M. 838.	104.847	343.987	In Kentucky, near Metropolis, Ill.	P. B. M. 929.	93.050	305.283
Do.	P. B. M. 839.	103.583	339.839	Do.	P. B. M. 930.	95.291	312.634
Do.	P. B. M. 840.	102.867	337.490	Do.	P. B. M. 931.	93.021	305.185
Do.	P. B. M. 841.	103.223	338.675	Do.	P. B. M. 932.	94.409	309.741
Do.	P. B. M. 842.	103.082	338.195	Do.	P. B. M. 933.	94.424	309.788
Do.	P. B. M. 843.	100.911	331.072	Do.	P. B. M. 934.	94.596	310.355
Near Raleigh, Ky.	P. B. M. 844.	107.661	353.219	Do.	P. B. M. 935.	93.685	307.365
Raleigh, Ky.	P. B. M. 845.	106.790	350.361	Near Ragland, Ky.	P. B. M. 936.	94.481	309.976
Near Browns Island, Ky.	P. B. M. 846.	106.500	350.700	Do.	P. B. M. 937.	93.314	306.147
Do.	P. B. M. 847.	106.559	349.601	Do.	P. B. M. 938.	94.493	310.017
In Kentucky, near Shawneetown, Ill.	P. B. M. 848.	105.159	345.000	Do.	P. B. M. 939.	98.003	321.531
Do.	P. B. M. 849.	101.276	332.271	Do.	P. B. M. 940.	96.749	317.417
Do.	P. B. M. 850.	105.349	345.631	Do.	P. B. M. 941.	92.593	303.783
Do.	P. B. M. 851.	105.079	344.746	Near Ogden, Ky.	P. B. M. 942.	96.611	316.964
Do.	P. B. M. 852.	101.605	333.348	Do.	P. B. M. 943.	97.239	319.024
Near Cincinnati Towhead, Ky.	P. B. M. 853.	101.755	333.842	Do.	P. B. M. 944.	95.151	312.174
Do.	P. B. M. 854.	97.035	327.082	Do.	P. B. M. 945.	96.606	316.948
Do.	P. B. M. 855.	103.866	340.768	In Kentucky, near Grand Chain, Ill.	P. B. M. 947.	97.773	320.778
Near Dekoven, Ky.	P. B. M. 856.	103.250	338.746	Do.	P. B. M. 948.	96.732	317.362
Do.	P. B. M. 857.	101.019	331.426	Do.	P. B. M. 949.	93.370	306.331
Do.	P. B. M. 858.	98.039	324.602	Do.	P. B. M. 950.	94.051	308.566
Do.	P. B. M. 859.	101.888	334.279	In Kentucky, near Caledonia, Ill.	P. B. M. 951.	94.494	310.020
Do.	P. B. M. 860.	101.035	331.479	Do.	P. B. M. 952.	92.595	303.788
Do.	P. B. M. 860A.	103.690	340.189	Do.	P. B. M. 953.	96.163	315.494
Near Caseyville, Ky.	P. B. M. 862.	103.912	340.917	Do.	P. B. M. 954.	94.433	309.820
Do.	P. B. M. 863.	102.635	336.728	Near Humphries Creek, Ky.	P. B. M. 955.	93.858	307.933
Do.	P. B. M. 864.	104.208	341.888	Do.	P. B. M. 956.	92.320	302.887
Near Weston, Ky.	P. B. M. 865.	100.787	330.665	Do.	P. B. M. 957.	91.958	301.700
Do.	P. B. M. 866.	105.315	345.520	Near Holloway, Ky.	P. B. M. 958.	97.286	319.178
Near Fords Ferry, Ky.	P. B. M. 867.	104.744	343.649	Do.	P. B. M. 959.	96.864	317.794
Fords Ferry, Ky.	P. B. M. 868.	99.039	326.868	Do.	P. B. M. 960.	97.190	318.865
In Kentucky, near Cave-in-Rock, Ill.	P. B. M. 869.	102.833	337.379	Holloway, Ky.	P. B. M. 961.	97.320	319.292
Do.	P. B. M. 870.	103.376	339.160	Near Holloway, Ky.	P. B. M. 962.	96.269	315.841
Do.	P. B. M. 871.	99.908	327.781	Do.	P. B. M. 963.	94.850	311.186
Near Tolu, Ky.	P. B. M. 872.	100.728	330.472	Near East Cairo, Ky.	P. B. M. 964.	96.267	315.836
Do.	P. B. M. 873.	102.883	337.541	Do.	P. B. M. 965.	95.153	312.180
Do.	P. B. M. 874.	102.721	337.009	Do.	P. B. M. 966.	94.296	309.369
Do.	P. B. M. 875.	97.839	321.300	Do.	P. B. M. 967.	93.669	307.293
Tolu, Ky.	P. B. M. 876.	103.211	338.618	Do.	P. B. M. 968.	93.647	307.241
Near Carrsville, Ky.	P. B. M. 880.	99.003	327.764	Terre Haute, Ind.	P. B. M. Traverse.	151.307	496.413
Do.	P. B. M. 881.	96.190	325.427	Do.	P. B. M. Vandalia.	146.951	482.122
Do.	P. B. M. 882.	98.507	323.184	Do.	(P. B. M. 1, Bolt.	143.611	471.164
Do.	P. B. M. 883.	101.711	333.608	Do.	Cap.	144.846	475.216
Do.	P. B. M. 884.	104.308	342.217	Do.	P. B. M. Wabash.	148.379	458.807
Do.	P. B. M. 885.	96.623	317.003	Do.	P. B. M. Brewery.	151.722	497.775
Do.	P. B. M. 886.	103.654	340.070	Do.	(P. B. M. 2, Bolt.	149.003	488.854
Do.	P. B. M. 887.	96.969	318.140	Do.	Cap.	150.237	492.903
				Near Prairieton, Ind.	(P. B. M. 3, Bolt.	147.335	483.381
					Cap.	148.574	487.446

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Prairie, Ind.	P. B. M. 4, Bolt.	142.486	467.472	New Harmony, Ind.	P. B. M. New Har-	115.475	378.854
Do.	Cap.	143.719	471.518	Do.	P. B. M. 40, Bolt.	114.946	377.118
Do.	P. B. M. 5, Bolt.	137.462	450.990	Do.	Cap.	116.182	381.174
In Indiana, near Darwin, Ill.	Cap.	138.601	455.028	Near New Harmony, Ind.	P. B. M. 41, 1903.	113.291	371.089
Do.	P. B. M. 6, Bolt.	137.386	450.740	Do.	P. B. M. 41, Bolt.	112.521	369.162
Do.	P. B. M. 7, Bolt.	136.153	446.085	Do.	Cap.	113.755	373.211
Near York, Ill.	Cap.	137.368	450.682	Do.	P. B. M. 42, 1903.	113.003	370.744
Do.	P. B. M. 8, Bolt.	138.386	454.021	Do.	P. B. M. 42, Bolt.	111.504	365.826
Do.	Cap.	139.628	458.080	Do.	Cap.	112.743	369.892
Do.	P. B. M. 9, Bolt.	138.962	443.903	Do.	P. B. M. 43, 1903.	112.518	369.153
Do.	Cap.	136.534	447.945	In Indiana, near Maunie, Ill.	P. B. M. 43, Bolt.	110.804	363.530
York, Ill.	P. B. M. 10, Bolt.	136.058	446.388	Do.	Cap.	112.036	367.572
Near York, Ill.	Cap.	137.294	450.439	Do.	P. B. M. 44, Bolt.	110.452	362.374
Hutsonville, Ill.	P. B. M. 11, Bolt.	137.627	451.531	Do.	Cap.	111.694	366.449
Do.	Cap.	138.859	455.573	Do.	P. B. M. Aldrich.	113.516	372.427
Do.	P. B. M. Hutsonville	137.614	451.489	Do.	P. B. M. 31, 1903.	109.424	359.002
Do.	P. B. M. 12, Bolt.	136.330	447.276	Do.	P. B. M. L&N.	113.781	373.296
Near Hutsonville, Ill.	Cap.	137.567	451.354	Do.	P. B. M. 45, Bolt.	109.140	358.070
Do.	P. B. M. 13, Bolt.	133.421	437.732	Do.	Cap.	110.366	362.022
In Illinois, near Merom, Ind.	Cap.	134.657	441.787	Maunie, Ill.	U. S. G. S. 375.	114.352	375.169
Do.	P. B. M. Plunkett.	133.680	438.582	In Indiana, near Maunie, Ill.	P. B. M. 33, 1903.	109.919	360.025
Do.	P. B. M. 14, Bolt.	132.575	434.957	Do.	P. B. M. 46, Bolt.	108.678	356.555
Riverton, Ind.	Cap.	133.811	439.012	Do.	Cap.	109.901	360.587
Do.	P. B. M. Riverton.	134.942	442.722	In Indiana, near mouth of Little Wabash.	P. B. M. 47, Bolt.	109.335	359.369
Near Riverton, Ind.	P. B. M. 15, Bolt.	134.561	441.472	Do.	Cap.	110.764	363.398
Do.	Cap.	135.791	445.507	Do.	P. B. M. 48, Bolt.	110.356	360.090
Do.	P. B. M. 16, Bolt.	130.729	428.900	Do.	Cap.	111.587	366.098
Do.	Cap.	131.965	432.955	Do.	P. B. M. 49, Bolt.	109.540	359.382
In Indiana, near Russellville, Ill.	P. B. M. 17, Bolt.	129.642	425.334	Do.	Cap.	110.780	363.450
Do.	Cap.	130.878	429.389	In Indiana, near mouth of Wabash.	P. B. M. 50, Bolt.	108.813	356.998
Do.	P. B. M. 18, Bolt.	128.827	422.660	Do.	Cap.	110.048	361.049
Do.	Cap.	130.053	428.683	Do.	P. B. M. 39, 1903.	108.239	348.719
Do.	P. B. M. 19, Bolt.	127.257	417.509	Do.	P. B. M. 51, Bolt.	104.628	343.267
Do.	Cap.	128.474	421.502	Do.	Cap.	105.872	347.349
Russellville, Ill.	P. B. M. 20, Bolt.	130.222	427.237	Do.	P. B. M. 52, Bolt.	102.888	337.299
Do.	Cap.	131.463	431.308	Do.	Cap.	104.047	341.361
Near Russellville, Ill.	P. B. M. 21, Bolt.	128.734	422.354	Do.	P. B. M. 53, Bolt.	105.092	344.789
Do.	Cap.	129.967	428.490	Do.	Cap.	106.322	348.825
In Illinois, near Vincennes, Ind.	P. B. M. 22, Bolt.	128.390	421.226	In Kentucky, near mouth of Wabash.	P. B. M. 54, Bolt.	113.299	371.715
Do.	Cap.	129.613	425.239	Do.	Cap.	114.517	375.711
Vincennes, Ind.	B. & O. No. 1.	128.139	420.402	Do.	P. B. M. Kentucky.	105.925	347.522
Near Vincennes, Ind.	B. & O. No. 2.	128.178	420.530				
Do.	P. B. M. 2, 1903, Cap.	127.727	419.051				
Do.	P. B. M. 23, Bolt.	125.425	411.498				
Do.	Cap.	126.658	415.544	Near Belen, N. Mex.	U. S. G. S. 4795.	1461.412	4794.649
Do.	P. B. M. 3, 1903.	128.100	420.275	Near Sabinal, N. Mex.	U. S. G. S. 4770.	1453.817	4769.731
In Indiana, near St. Francisville, Ill.	P. B. M. 24, Bolt.	123.736	405.957	Do.	U. S. G. S. 4762.	1451.537	4762.251
Do.	Cap.	124.956	409.959	Do.	U. S. G. S. 4743.	1445.640	4742.903
Do.	P. B. M. Big Four.	126.963	416.545	Do.	U. S. G. S. 4740.	1444.796	4740.135
Do.	P. B. M. 25, Bolt.	124.869	409.674	Near Lajoya, N. Mex.	U. S. G. S. 4720.	1438.583	4719.751
Do.	Cap.	126.099	413.710	Do.	U. S. G. S. 4691.	1429.759	4690.401
Do.	P. B. M. 26, Bolt.	122.440	401.706	Near Alamillo, N. Mex.	U. S. G. S. 4698.	1432.022	4698.230
Near Little Rock, Ind.	Cap.	123.676	405.760	Do.	U. S. G. S. 4696.	1431.199	4695.525
Do.	P. B. M. 27, Bolt.	122.128	400.682	Alamillo, N. Mex.	U. S. G. S. 4653.	1418.223	4652.954
Little Rock, Ind.	Cap.	123.358	404.717	Near Alamillo, N. Mex.	U. S. G. S. 4635.	1412.615	4634.555
Do.	P. B. M. 10, 1903.	122.885	403.165	Do.	U. S. G. S. 4628.	1410.147	4626.457
Near Little Rock, Ind.	P. B. M. 28, Bolt.	122.248	401.075	Near Socorro, N. Mex.	U. S. G. S. 4597.	1401.312	4597.471
Do.	Cap.	123.483	405.127	Socorro, N. Mex.	U. S. G. S. 4593.	1400.008	4593.193
In Indiana, near Mount Carmel, Ill.	P. B. M. 29, Bolt.	122.262	401.121	Do.	U. S. G. S. SOCR	1394.204	4574.151
Do.	Cap.	123.491	405.154	Do.	U. S. G. S. 4568.		
Do.	P. B. M. 12, 1903.	121.114	397.354	Do.	U. S. G. S. 4566.	1391.700	4565.936
Do.	P. B. M. 13, 1903.	120.936	396.770	Do.	U. S. G. S. 4548.	1386.351	4548.387
Do.	P. B. M. Grand Rapids.	120.934	396.765	San Antonio, N. Mex.	U. S. G. S. 4539.	1383.633	4539.469
Do.	P. B. M. 30, Bolt.	119.222	391.147	Near San Antonio, N. Mex.	U. S. G. S. 4533.	1381.574	4532.714
Do.	Cap.	120.451	395.180	Do.	U. S. G. S. 4509.	1374.454	4509.354
Do.	P. B. M. 15, 1903.	119.471	391.965	Near Elmhurst, N. Mex.	U. S. G. S. 4498.	1371.194	4498.659
Do.	P. B. M. 31, Bolt.	117.796	386.469	Near San Marcial, N. Mex.	U. S. G. S. 4489.	1368.325	4489.247
Do.	Cap.	119.024	390.498	Do.	U. S. G. S. 4472.	1363.193	4472.376
In Indiana, near Rochester, Ill.	P. B. M. 17, 1903.	118.886	390.045	San Marcial, N. Mex.	U. S. G. S. 106.	1358.959	4458.518
Near Crowleyville, Ind.	P. B. M. 32, Bolt.	117.551	385.666	Do.	U. S. G. S. 4458.	1358.780	4457.931
Do.	Cap.	118.792	389.736	Near San Marcial, N. Mex.	U. S. G. S. 107.	1360.314	4462.963
Do.	P. B. M. 18, 1903.	118.443	388.591	Do.	U. S. G. S. 110.	1371.441	4486.499
In Indiana, near Grayville, Ill.	P. B. M. 33, Bolt.	116.879	383.460	Pope, N. Mex.	U. S. G. S. 113.	1366.560	4581.881
Do.	Cap.	118.093	387.443	Near Pope, N. Mex.	U. S. G. S. 116.	1415.296	4643.350
Do.	P. B. M. 20, 1903.	117.766	386.370	Do.	U. S. G. S. 119.	1438.908	4720.817
Do.	P. B. M. 34, Bolt.	116.293	381.538	Lava, N. Mex.	U. S. G. S. 122.	1439.158	4721.638
Do.	Cap.	117.519	385.561	Near Lava, N. Mex.	U. S. G. S. 123.	1436.085	4711.556
Do.	P. B. M. 35, Bolt.	115.858	380.111	Do.	U. S. G. S. 126.	1427.574	4683.632
Do.	Cap.	117.089	384.149	Do.	U. S. G. S. 129.	1417.853	4651.739
Do.	P. B. M. 22, 1903.	115.885	380.199	Do.	U. S. G. S. 132.	1440.135	4724.843
Do.	P. B. M. 36, Bolt.	115.203	377.961	Near Crocker, N. Mex.	U. S. G. S. 135.	1458.869	4786.306
Do.	Cap.	116.439	382.017	Do.	U. S. G. S. 138.	1470.331	4843.596
Do.	P. B. M. 23, 1903.	116.258	381.423	Do.	U. S. G. S. 141.	1458.856	4786.264
Do.	P. B. M. 37, Bolt.	114.273	374.910	Engle, N. Mex.	U. S. R. S. 4727.	1453.980	4770.266
Do.	Cap.	115.506	378.066	Near Engle, N. Mex.	U. S. G. S. 147.	1446.838	4746.834
Do.	P. B. M. 25, 1903.	118.597	389.097	Do.	U. S. G. S. 150.	1430.739	4684.016
Do.	P. B. M. 38, Bolt.	114.796	378.627	Near Cutler, N. Mex.	U. S. G. S. 153.	1430.517	4693.287
Do.	Cap.	116.018	380.636	Do.	U. S. G. S. 156.	1428.268	4685.999
Near New Harmony, Ind.	P. B. M. 39, Bolt.	115.568	379.160	Near Aleman, N. Mex.	U. S. G. S. 159.	1415.362	4643.567
Do.	Cap.	116.787	383.159	Do.	U. S. G. S. 162.	1401.572	4598.324
Do.	P. B. M. 28, 1903.	115.369	378.506	Near Upham, N. Mex.	U. S. G. S. 165.	1386.557	4549.063
New Harmony, Ind.	U. S. G. S. 392 Vin.	117.165	384.399	Do.	U. S. G. S. 168.	1369.123	4541.883
Do.	U. S. G. S. 387 Vin.	117.937	386.931	Do.	U. S. G. S. 171.	1349.784	4428.416
				Do.	U. S. G. S. 174.	1329.806	4362.872

Place.	Designation of bench mark.	Standard elevation.		Place.	Designation of bench mark.	Standard elevation.	
		Meters.	Feet.			Meters.	Feet.
Near Grama, N. Mex.	U. S. G. S. 177.	1299.055	4261.983	Cory, Ind.	U. S. G. S. 634.	193.138	633.653
Near Rincon, N. Mex.	U. S. G. S. 180.	1252.296	4108.575	Near Cory, Ind.	U. S. G. S. 608.	185.172	607.518
Rincon, N. Mex.	U. S. G. S. 283B.	1238.547	4063.467	Riley, Ind.	U. S. G. S. 669.	173.375	568.814
Do.	U. S. G. S. 283B.	1238.364	4062.866	Near Riley, Ind.	U. S. G. S. 524.	159.631	523.722
Near Rincon, N. Mex.	U. S. G. S. 286B.	1226.743	4024.739	Near Spring Hill, Ind.	U. S. G. S. 493.	150.145	492.601
Near Detroit, N. Mex.	U. S. G. S. 290B.	1222.900	4012.131	Terre Haute, Ind.	U. S. G. S. 495.	150.798	494.743
Near Tonuco, N. Mex.	U. S. G. S. 293B.	1217.123	3993.178	Do.	U. S. G. S. 513.	156.259	512.660
Do.	U. S. G. S. 296B.	1215.920	3989.230	Near Terre Haute, Ind.	U. S. E. 482.	146.968	482.178
Near Selden, N. Mex.	U. S. G. S. 299B.	1209.644	3968.641	West Terre Haute, Ind.	U. S. G. S. 477.	145.211	476.413
Do.	U. S. G. S. 3932.	1210.918	3972.820	Near Liggett, Ind.	U. S. G. S. 508.	154.685	507.496
Do.	U. S. G. S. 303B.	1206.068	3956.908	Near Farrington, Ill.	U. S. G. S. 580.	176.640	579.526
Stewarts Ranch, N. Mex.	U. S. G. S. 306B.	1209.974	3969.723	Marley, Ill.	U. S. G. S. 644.	196.359	644.221
Near Stewarts Ranch, N. Mex.	U. S. G. S. 309B.	1198.570	3932.309	Near Marley, Ill.	U. S. G. S. 673.	205.195	673.210
Do.				Do.	U. S. G. S. 728.	221.931	728.119
Near Dona Ana, N. Mex.	U. S. G. S. 312B.	1192.813	3913.420	Paris, Ill.	U. S. G. S. 739.	225.330	739.270
Do.	U. S. G. S. 315B.	1188.912	3900.622	May, Ill.	U. S. G. S. 691.	210.452	690.458
Las Cruces, N. Mex.	U. S. R. S. 3855.	1187.575	3896.236	Near May, Ill.	U. S. G. S. 681.	207.437	680.566
Do.	U. S. R. S. 3855A.	1187.602	3896.325	Redmon, Ill.	U. S. G. S. 691.	210.411	690.323
Do.	U. S. G. S. 318B.	1186.923	3894.096	Near Borton, Ill.	U. S. G. S. 664.	203.979	669.221
Mesilla Park, N. Mex.	U. S. G. S. 3837.	1182.132	3878.378	Near Isabel, Ill.	U. S. G. S. 645.	196.500	644.684
Near Mesilla Park, N. Mex.	U. S. G. S. 323B.	1178.477	3866.387	Near Oakland, Ill.	U. S. G. S. 659.	200.778	658.719
Do.	U. S. G. S. 3813.	1174.856	3854.507				
Do.	U. S. G. S. 328B.	1171.549	3843.657				
Mesquite, N. Mex.	U. S. G. S. 3794.	1169.114	3835.668	Mitchell, Ind.	U. S. G. S. 688.	209.728	688.082
Near Mesquite, N. Mex.	U. S. G. S. 332B.	1165.532	3823.916	Near Mitchell, Ind.	U. S. G. S. 707.	215.526	707.104
Vado, N. Mex.	U. S. G. S. 3782.	1165.514	3823.857	Orleans, Ind.	U. S. G. S. 636.	193.907	636.176
Berino, N. Mex.	U. S. G. S. 336B.	1159.202	3803.148	Near Leipsic, Ind.	U. S. G. S. 709.	216.120	709.054
Near Berino, N. Mex.	U. S. G. S. 3760.	1158.823	3801.905	Do.	U. S. G. S. 735.	223.942	734.717
Do.	U. S. G. S. 340B.	1156.644	3794.756	Near Saltville, Ind.	U. S. G. S. 774.	235.858	773.811
Near La Tuna, Tex.	U. S. G. S. 3780.	1156.086	3792.926	Near Campbellsburg, Ind.	U. S. G. S. 839.	255.599	838.578
Vinton, Tex.	U. S. G. S. 3774.	1154.273	3786.977	Near Hitchcock, Ind.	U. S. G. S. 886.	270.025	885.906
Canutillo, Tex.	U. S. G. S. 350B.	1147.504	3764.769	Hitchcock, Ind.	U. S. G. S. 880.	268.290	880.215
Near Montoya, Tex.	U. S. G. S. 354B.	1143.332	3751.081	Near Salem, Ind.	U. S. G. S. 721.	219.783	721.071
Near Whites Spur, Tex.	U. S. G. S. 357B.	1140.000	3740.150	Salem, Ind.	U. S. G. S. 728.	221.805	727.705
Do.	U. S. G. S. 359B.	1137.942	3733.398	Near Salem, Ind.	U. S. G. S. 728a.	221.955	728.197
Near El Paso, Tex.	Boundary No. 1.	1135.822	3726.443	Do.	U. S. G. S. 760.	231.603	759.851
				Near Norris, Ind.	U. S. G. S. 835.	254.493	834.949
Duquoin, Ill.	U. S. G. S. 468.	142.777	468.428	Near Farabee, Ind.	U. S. G. S. 814.	248.026	813.732
Near Duquoin, Ill.	U. S. G. S. 396.	120.824	396.403	Near Pekin, Ind.	U. S. G. S. 704.	214.525	703.821
Near McDonald, Ill.	U. S. G. S. 402.	122.497	401.893	Near Borden, Ind.	U. S. G. S. 577.	175.803	576.781
Mulkeytown, Ill.	U. S. G. S. 449.	136.861	449.018	Do.	U. S. G. S. 520.	158.609	520.369
Christopher, Ill.	U. S. G. S. 443.	135.287	443.854	Bridgeport, Ind.	U. S. G. S. 504.	153.542	503.746
Near Christopher, Ill.	U. S. G. S. 392.	119.773	392.955	Near Wilson, Ind.	U. S. G. S. 545.	166.121	545.015
Do.	U. S. G. S. 438.	133.852	439.146	St. Joseph, Ind.	U. S. G. S. 547.	166.676	546.836
Benton, Ill.	U. S. G. S. 474.	145.028	475.812	Near New Albany, Ind.	U. S. G. S. 536.	163.192	535.406
Near Benton, Ill.	U. S. G. S. 405.	146.296	406.587	New Albany, Ind.	U. S. G. S. 456.	138.908	455.734
Smother, Ill.	U. S. G. S. 479.	146.296	406.587	Do.	464 Ind.	141.360	463.778
Parrish, Ill.	U. S. G. S. 438.	133.953	439.477	Louisville, Ky.	R. R. Bridge.	136.481	447.771
Thompsonville, Ill.	U. S. G. S. 494.	150.990	495.373				
West End, Ill.	U. S. G. S. 429.	131.210	430.479	Georgetown, Ky.	U. S. G. S. 866.	263.818	865.543
Near Rileyville, Ill.	U. S. G. S. 392.	119.844	393.188	Near Georgetown, Ky.	U. S. G. S. 798.	243.142	797.709
Galatia, Ill.	U. S. G. S. 397.	*121.356	398.148	Duval, Ky.	U. S. G. S. 840.	256.152	840.392
Near Galatia, Ill.	U. S. G. S. Milepost.	120.202	394.400	Stamping Ground, Ky.	U. S. G. S. 802.	244.555	802.344
Near Raleigh, Ill.	U. S. G. S. 390.	119.194	391.056	Near Stamping Ground, Ky.	U. S. G. S. 714.	217.500	713.581
Eldorado, Ill.	U. S. G. S. 388.	118.219	387.857				
Near Grayson, Ill.	U. S. G. S. Grayson.	119.665	392.601	Switzer, Ky.	U. S. G. S. 732.	223.282	732.551
Do.	U. S. G. S. Crossroads.	110.640	362.992	Near Switzer, Ky.	U. S. B. M. 744.	226.912	744.460
Equality, Ill.	U. S. G. S. Station.	110.404	362.217	Elkhorn, Ky.	U. S. G. S. 673.	205.199	673.224
Near Equality, Ill.	U. S. G. S. Fowler.	114.869	376.866	Stedmantown, Ky.	U. S. G. S. 714.	217.752	714.408
Do.	U. S. G. S. Six Mile.	107.620	353.084	Near Stedmantown, Ky.	U. S. B. M. 675.	205.677	674.792
Near Cypress Junction, Ill.	U. S. G. S. Five Mile.	120.838	396.449	Frankfort, Ky.	U. S. G. S. 511.	155.816	511.206
Shawneetown, Ill.	P. B. M. Station.	106.538	349.534	Do.	U. S. G. S. 512.	156.159	512.332
Do.	P. B. M. Hotel.	111.492	365.787	Near Kennebec, Ky.	U. S. G. S. 537.	163.665	536.958
				Do.	U. S. B. M. 562.	171.281	561.945
Yockey, Ind.	U. S. G. S. 590.	179.948	590.380	Near Benson, Ky.	Bridge.	182.802	599.743
Near Yockey, Ind.	U. S. G. S. 508.	154.875	508.119	Do.	U. S. G. S. 600.	182.802	599.743
Bedford, Ind.	U. S. G. S. 700.	213.237	699.595	Hatton, Ky.	U. S. G. S. 714.	217.772	714.474
Dark Hollow, Ind.	U. S. G. S. 503.	153.291	502.923	Near Hatton, Ky.	U. S. G. S. 829.	252.862	829.598
Avoca, Ind.	U. S. G. S. 557.	199.705	556.774	Do.	U. S. G. S. 881.	268.415	880.625
Springville, Ind.	U. S. G. S. 644.	196.177	643.624	Bagdad, Ky.	U. S. G. S. 912.	277.959	911.937
Near Springville, Ind.	U. S. G. S. 575.	175.362	575.333	Christiansburg, Ky.	U. S. G. S. 903.	275.357	903.401
Armstrong, Ind.	U. S. G. S. 551.	167.799	550.521	Near Christiansburg, Ky.	U. S. B. M. 882.	268.819	881.951
Near Armstrong, Ind.	U. S. G. S. 565.	172.059	564.497	Do.	U. S. G. S. 849.	258.901	849.411
Owensburg, Ind.	U. S. G. S. 641.	195.304	640.760	Do.	U. S. G. S. 724.	220.664	723.962
Robison, Ind.	U. S. G. S. 543.	162.360	542.548	Shelbyville, Ky.	U. S. G. S. 760.	231.560	759.709
Near Robison, Ind.	U. S. G. S. 755.	230.027	754.680	Scotts Station, Ky.	U. S. G. S. 750.	228.643	750.139
Cincinnati, Ind.	U. S. G. S. 880.	288.330	880.346	Near Field Station, Ky.	U. S. G. S. 725.	220.962	724.939
Kolcan, Ind.	U. S. G. S. 519.	158.321	519.425	Simpsonville, Ky.	U. S. G. S. 825.	251.395	824.785
Near Mineral City, Ind.	U. S. G. S. 509.	155.002	508.536	Connor, Ky.	U. S. G. S. 701.	213.797	701.433
Do.	U. S. G. S. 509a.	155.168	509.080	Long Run, Ky.	U. S. G. S. 629.	191.841	629.398
Bloomfield, Ind.	U. S. G. S. 534.	162.732	533.897	Near Eastwood, Ky.	U. S. G. S. 640.	195.070	639.902
Do.	U. S. G. S. 541.	164.834	540.792	Near Beckley, Ky.	U. S. G. S. 595.	181.424	595.222
Near Elliston, Ind.	U. S. G. S. 503.	153.366	503.168	Do.	U. S. G. S. 634.	193.338	634.310
Do.	U. S. G. S. 607.	154.410	506.593	Near Avoca, Ky.	U. S. G. S. 652.	198.914	652.603
Worthington, Ind.	U. S. G. S. 526.	160.388	526.206	Anchorage, Ky.	U. S. G. S. 724.	220.756	724.264
Near Worthington, Ind.	U. S. G. S. 521.	154.681	507.547	Lyndon, Ky.	U. S. G. S. 561.	171.141	561.485
Do.	U. S. G. S. 562.	171.174	561.593	Near Warwickville, Ky.	U. S. G. S. 539.	164.282	538.982
Coal City, Ind.	U. S. G. S. 659.	200.976	659.368	St. Matthews, Ky.	U. S. G. S. 550.	167.635	549.982
Near Coal City, Ind.	U. S. G. S. 596.	181.617	595.855	Near St. Matthews, Ky.	U. S. G. S. 548.	166.989	547.863
Clay City, Ind.	U. S. G. S. 588.	179.155	587.778	Do.	U. S. G. S. 553.	168.759	553.670
Near Clay City, Ind.	U. S. G. S. 558.	170.167	558.289	Louisville, Ky.	No. 49.	138.958	457.919
Saline City, Ind.	U. S. G. S. 569.	173.525	569.307	Do.	B. M. 86 or No. 16.	138.481	454.333
				Do.	B. M. 13.	138.388	454.028

*Probably destroyed.

ELEVATIONS AT RAILROAD STATIONS.

In recent years the elevation of the rail in front of each railroad station, on the lines of precise leveling by the Coast and Geodetic Survey, has been determined usually by a single rod reading.

The following list contains the elevations of the rail at stations determined since early in 1906.

The name in italics of a railroad applies to all stations which follow it until the name of a second railroad is given in the list, and so on. Exceptions to this rule are indicated by footnotes. The elevations of the rails in this list were computed on the same basis as the standard elevations.

Additional elevations of rails at railroad stations appeared in the following publications of the Coast and Geodetic Survey:

Appendix 1 of the Report for 1898.

Appendix 2 of the Report for 1898.

Appendix 3 of the Report for 1898.

Appendix 5 of the Report for 1899.

Appendix 6 of the Report for 1899.

Appendix 7 of the Report for 1899.

Appendix 8 of the Report for 1899.

Appendix 3 of the Report for 1903.

Appendix 6 of the Report for 1904.

Appendix 7 of the Report for 1904.

Appendix 4 of the Report for 1905.

Precise Leveling in the United States, 1903-1907.

In all except one of these publications the elevations of rails as given are on the same basis as the tabulated results of the observations before adjustment. The exception is Appendix 4 of the Report for 1905, in which the rail elevations are given on the same basis as the corrected or adjusted elevations.

The observed elevations of the rail previously published (excepting those in Appendix 4 of the Report for 1905) may be changed to the standard elevations by the following equation:

Standard elevation of rail = observed elevation of rail + standard elevation of a bench mark in its vicinity - observed elevation of that bench mark.

Example: To find the standard elevation of the rail at Kingfisher, Okla. On page 311 of Appendix 3, Report for 1903, the elevation of the rail at Kingfisher is given as 320.39 meters and that of E, an adjacent bench mark, as 320.8366 meters. The standard elevation of E is 320.963. (See p. 129 of this publication.)

Therefore,

Standard elevation of rail at Kingfisher = $320.39 + 320.963 - 320.8366 = 320.52$ meters.

The rail elevations in Appendix 4 of 1905 may be converted into standard elevations by the following equation:

Standard elevation of rail = "corrected" elevation of rail + standard elevation of a bench mark in its vicinity - "corrected" elevation of that bench mark.

Example: To find the standard elevation of the rail at Yakima City, Wash. On page 214 of Appendix 4, Report for 1905, the rail elevation is given as 298.91 meters. As is stated on page 212, it is computed on the same basis as the "corrected" elevations in the tabulation immediately preceding. The "corrected" elevation of D₂, a bench mark near Yakima City, was 290.2937 meters (see p. 211, Report for 1905). The standard elevation of D₂ is 290.346 meters. (See p. 133 of this publication.)

Therefore,

Standard elevation of rail at Yakima City = $298.91 + 290.346 - 290.2937 = 298.96$ meters.

Table of elevations at railroad stations.

Place.	Standard elevation.		Place.	Standard elevation.	
	Meters.	Feet.		Meters.	Feet.
<i>Atchison, Topeka & Santa Fe Ry.</i>			<i>Oregon Short Line R. R.—Continued.</i>		
Ladrillo, Cal.	16.43	53.90	Dyers, Mont.	1665.57	5464.46
Selwyn, Cal.	71.97	236.12	Woodin, Mont.	1693.47	5555.99
Sorrento, Cal.	9.68	31.76	Beaudines Spur, Mont.	1734.69	5691.23
Del Mar, Cal.	33.90	111.22	Feely, Mont.	1772.19	5814.26
Encinitas, Cal.	24.79	81.33	Buxton, Mont.	1684.44	5526.37
Merle, Cal.	16.96	55.64	Silver Bow, Mont.	1627.06	5338.11
La Costa, Cal.	12.08	39.63	Butte, Mont.	1672.62	5487.59
Carlsbad, Cal.	12.76	41.86	Roy, Utah	1350.80	4431.75
Oceanside, Cal.	13.71	44.98	Syracuse Junction, Utah	1367.02	4484.96
Las Flores, Cal.	25.85	84.81	Layton, Utah	1327.61	4355.67
Don, Cal.	41.64	136.61	Evona, Utah	1318.20	4324.79
San Onofre, Cal.	9.44	30.97	Farmington, Utah	1297.32	4256.29
Mateo, Cal.	4.98	16.34	Kaysville, Utah	1308.46	4292.84
Serra, Cal.	5.61	18.41	Centerville, Utah	1294.27	4246.28
San Juan Capistrano, Cal.	31.68	103.94	Woods Cross, Utah	1308.24	4292.12
El Toro, Cal.	129.09	423.52	Sinkins, Utah	1305.16	4282.01
Irvine, Cal.	59.88	196.46	Hatch, Utah	1304.55	4280.01
Aliso, Cal.	28.54	93.63	Stockyard Junction, Utah	1298.70	4260.82
Santa Ana, Cal.	40.64	133.33	Becks, Utah	1286.93	4222.20
Olive, Cal.	68.18	223.69	Salt Lake City, Utah	1297.16	4255.77
Yorba, Cal.	81.13	266.17	<i>Atchison, Topeka & Santa Fe Ry.</i>		
Esperanza, Cal.	102.99	337.89	Nebo, Cal.	621.95	2040.51
Horseshoe Bend, Cal.	117.40	385.17	Daggett, Cal.	611.64	2006.69
Gypsum, Cal.	127.45	418.14	Minneola, Cal.	583.59	1914.66
Crary, Cal.	148.74	487.99	Newberry, Cal.	557.98	1830.64
Corona, Cal.	183.57	602.26	Troy, Cal.	542.43	1779.62
Porphry, Cal.	191.92	629.66	Hector, Cal.	567.73	1862.63
May, Cal.	211.35	693.40	Pisgah, Cal.	654.58	2147.57
Arlington, Cal.	248.21	814.34	Lavie, Cal.	662.10	2172.24
Casa Blanca, Cal.	262.46	862.20	Arctic, Cal.	616.52	2022.70
Pachappa, Cal.	263.87	865.71	Ludlow, Cal.	542.39	1779.49
Salt Lake, Cal.	268.15	881.10	Ash Hill, Cal.	562.39	1943.53
Highgrove, Cal.	287.98	944.81	Klondike, Cal.	503.45	1651.74
Cofton, Cal.	297.91	977.39	Siberia, Cal.	389.61	1278.25
San Bernardino, Cal.	328.49	1077.72	Nome, Cal.	306.17	1004.49
Verdemont, Cal.	531.29	1743.07	Bagdad, Cal.	239.97	787.30
Keenbrook, Cal.	756.02	2480.38	Amboy, Cal.	187.16	614.04
Cajon, Cal.	891.79	2925.81	Bengal, Cal.	216.08	708.92
Dell, Cal.	1057.08	3468.10	Cadiz, Cal.	250.45	821.68
Summit, Cal.	1165.40	3823.48	Siam, Cal.	316.12	1037.14
Lugo, Cal.	1069.49	3508.82	Danby, Cal.	412.28	1352.62
Hesperia, Cal.	972.06	3189.17	Armo, Cal.	469.05	1538.87
Victorville, Cal.	827.90	2716.20	Essex, Cal.	527.78	1731.56
Oro Grande, Cal.	803.19	2635.13	Fenner, Cal.	638.87	2096.03
Helen, Cal.	740.72	2430.18	Piute, Cal.	710.81	2332.05
Cottonwood, Cal.	694.41	2278.24	Goffs, Cal.	787.62	2584.05
Todd, Cal.	683.38	2242.06	Vontrigger, Cal.	1026.95	3369.25
Barstow, Cal.	641.79	2105.61	Blackburn, Cal.	1131.01	3710.65
<i>Oregon Short Line R. R.</i>			Ledge, Cal.	1326.48	4351.96
Pocatello, Idaho	1360.27	4462.82	Purdy, Cal.	1379.34	4525.38
Tyhee, Idaho	1359.37	4459.87	Barnwell, Cal.	1466.12	4810.09
Ross Fork, Idaho	1355.26	4446.38	Vanderbilt, Cal.	1268.28	4154.45
Gibson, Idaho	1361.04	4465.34	Leastalk, Cal.	1071.22	3514.49
Blackfoot, Idaho	1371.30	4499.00	<i>San Pedro, Los Angeles & Salt Lake R. R.</i>		
Wapello, Idaho	1384.89	4543.59	Moore, Cal.	1003.12	3291.07
Firth, Idaho	1392.39	4568.20	Nipton, Cal.	922.78	3027.49
Monroe, Idaho	1403.94	4606.09	Lyons, Cal.	855.27	2806.00
Shelley, Idaho	1410.42	4627.35	Calada, Cal.	837.19	2746.68
Idaho Falls, Idaho	1433.87	4704.29	Roach, Nev.	796.44	2612.90
Payne, Idaho	1446.12	4744.48	Borax, Nev.	817.75	2682.90
Bassett, Idaho	1453.92	4770.07	Jean, Nev.	874.31	2868.47
Market Lake, Idaho	1455.48	4775.19	Sutor, Nev.	926.74	3040.48
Hawgood, Idaho	1463.41	4821.51	Erie, Nev.	950.85	3119.58
Hamer, Idaho	1463.41	4801.20	Sloan, Nev.	862.56	2829.92
Camas, Idaho	1467.94	4816.07	Bard, Nev.	785.81	2578.11
Jones, Idaho	1492.29	4895.95	Arden, Nev.	736.75	2417.15
Dubois, Idaho	1569.31	5148.64	Bracken, Nev.	661.61	2170.63
High Bridge, Idaho	1689.50	5542.97	Las Vegas, Nev.	618.88	2030.44
Spencer, Idaho	1793.10	5882.86	<i>Northern Pacific Ry.</i>		
Humphrey, Idaho	1984.85	6511.96	Skones, Mont.	1789.76	5871.90
Monida, Mont.	2071.85	6797.39	Highview, Mont.	1927.79	6324.76
Williams, Mont.	2006.15	6581.84	Homestake, Mont.	1930.59	6333.94
Lima, Mont.	1907.14	6257.01	Lewis Spur, Mont.	1876.71	6157.17
Dell, Mont.	1833.08	6014.03	Welch, Mont.	1732.55	5684.21
Crab Tree, Mont.	1773.77	5819.44	Spire Rock, Mont.	1588.40	5211.28
Red Rock, Mont.	1705.60	5595.79	Pipestone, Mont.	1432.39	4699.43
Armstead, Mont.	1673.67	5491.03	Whitehall, Mont.	1327.91	4356.65
Grayling, Mont.	1642.17	5387.69	Jefferson Island, Mont.	1303.63	4276.99
Dalys, Mont.	1623.07	5325.02	Lime Spur, Mont.	1294.21	4246.09
Barratts, Mont.	1600.86	5252.15	Sappington, Mont.	1277.29	4190.58
Dillon, Mont.	1552.81	5094.51	Willow Creek, Mont.	1265.31	4151.27
Bond, Mont.	1573.76	5133.24	Three Forks, Mont.	1239.27	4065.84
Apex, Mont.	1653.84	5425.97	Gallatin, Mont.	1234.35	4049.70
Glen, Mont.	1524.18	5000.58	Logan, Mont.	1250.96	4104.19
Lavon, Mont.	1539.44	5050.65	Manhattan, Mont.	1293.66	4244.28
Browne, Mont.	1545.76	5071.38	Central Park, Mont.	1319.52	4329.12
Melrose, Mont.	1579.95	5183.55	Belgrade, Mont.	1358.58	4457.27
Big Hole, Mont.	1614.46	5296.77	Storey, Mont.	1401.52	4598.15
Malden Rock, Mont.	1620.82	5317.64	Bozeman, Mont.	1452.03	4763.87
Keith, Mont.	1623.23	5325.55	Gordon, Mont.	1519.30	4984.57
Divide, Mont.	1644.96	5396.84	Chestnut, Mont.	1603.79	5261.77

Table of elevations at railroad stations—Continued.

Place.	Standard elevation.		Place.	Standard elevation.	
	Meters.	Feet.		Meters.	Feet.
<i>Northern Pacific Ry.—Continued.</i>			<i>San Pedro, Los Angeles & Salt Lake R. R.—Con.</i>		
West End, Mont.	1690.51	5546.28	St. John, Utah	1530.90	5022.63
Muir, Mont.	1689.74	5543.75	Ajax, Utah	1540.74	5051.94
Hoppers, Mont.	1583.71	5195.89	Faust, Utah	1601.75	5255.07
Coal Spur, Mont.	1454.12	4770.72	Vernon, Utah	1679.37	5509.73
Livingston, Mont.	1371.48	4499.60	Loigreen, Utah	1769.21	5804.48
Africa, Mont.	1352.98	4438.80	Boulter, Utah	1838.97	6033.35
Mission, Mont.	1338.09	4389.05	Tintie, Utah	1785.73	5858.68
Elton, Mont.	1308.70	4291.63	Mammoth, Utah	1836.82	6026.30
Springdale, Mont.	1287.00	4222.43	Jericho, Utah	1618.29	5309.34
Carney, Mont.	1266.52	4155.24	Champlin, Utah	1510.08	4954.32
Dehart, Mont.	1251.17	4104.88	Adams, Utah	1485.19	4872.66
Bigtimber, Mont.	1244.47	4082.90	Lynndyl, Utah	1458.57	4785.32
Reynolds, Mont.	1235.94	3959.77	Cline, Utah	1457.15	4780.67
Greycliff, Mont.	1197.53	3928.90	Akin, Utah	1414.34	4640.21
Patum, Mont.	1177.29	3862.49	Oasis, Utah	1400.97	4594.35
Quebec, Mont.	1158.83	3801.93	Van, Utah	1394.74	4575.91
Reedpoint, Mont.	1141.68	3745.66	Neels, Utah	1407.68	4618.86
Oneida, Mont.	1130.78	3709.90	Borden, Utah	1438.17	4718.40
Merrill, Mont.	1117.95	3667.81	Goss, Utah	1453.43	4768.46
Wataga, Mont.	1108.39	3636.44	Cruz, Utah	1486.31	4876.33
Columbus, Mont.	1092.72	3585.03	Pumice, Utah	1478.76	4853.56
Misko, Mont.	1080.20	3543.96	Black Rock, Utah	1479.00	4852.35
Rapids, Mont.	1064.13	3491.23	Malone, Utah	1491.35	4892.87
Youngs Point, Mont.	1045.15	3428.96	Zenda, Utah	1506.78	4943.49
Park City, Mont.	1035.55	3397.47	<i>Chicago, Burlington & Quincy R. R.</i>		
Laurel, Mont.	1005.42	3298.62	Crawford, Nebr.	1119.88	3674.14
Foster, Mont.	984.22	3229.06	Horn, Nebr.	1122.42	3682.47
Yegen, Mont.	972.56	3190.81	Joder, Nebr.	1136.50	3728.67
Billings, Mont.	953.08	3126.90	Orella, Nebr.	1164.22	3819.61
Lockwood, Mont.	936.06	3071.06	Mansfield, Nebr.	1107.04	3632.01
<i>San Pedro, Los Angeles & Salt Lake R. R.</i>			Ardmore, S. Dak.	1094.80	3559.05
Las Vegas, Nev.	618.84	2030.31	Rumford, S. Dak.	1068.27	3504.81
Stewart, Nev.	581.57	1908.03	Provo, S. Dak.	1130.40	3708.65
Valley, Nev.	613.20	2011.81	Dennis, S. Dak.	1083.11	3553.50
Dike, Nev.	581.25	1924.63	Edgemont, S. Dak.	1032.08	3451.70
Summit of Grade, Nev.	752.97	2470.37	Paine, S. Dak.	1088.55	3440.12
Apex, Nev.	750.34	2461.74	Marietta, S. Dak.	1064.13	3491.23
Garnet, Nev.	676.86	2220.00	Argentine, S. Dak.	1108.41	3636.51
Dry Lake, Nev.	636.82	2089.30	Dewey, S. Dak.	1130.02	3707.41
Crystal, Nev.	618.72	2029.62	Dakoming, Wyo.	1168.16	3832.54
Ute, Nev.	587.47	1927.39	Clifton, Wyo.	1202.70	3945.86
Byron, Nev.	541.71	1777.26	Owens, Wyo.	1230.80	4038.05
Moapa, Nev.	508.02	1666.73	Spencer, Wyo.	1279.43	4197.60
Acton, Nev.	532.06	1745.60	Johnson, Wyo.	1322.05	4337.43
Guelpha, Nev.	530.81	1741.50	Newcastle, Wyo.	1315.69	4316.56
Rox, Nev.	580.08	1903.15	Pedro, Wyo.	1280.70	4201.76
Hoya, Nev.	619.66	2033.00	Osage, Wyo.	1315.81	4316.95
Galt, Nev.	686.02	2250.72	Jerome, Wyo.	1283.27	4210.19
Vigo, Nev.	742.00	2434.38	Upton, Wyo.	1290.73	4234.67
Carp, Nev.	788.21	2585.99	Thornton, Wyo.	1317.96	4324.01
St. George, Nev.	821.10	2693.89	Kara, Wyo.	1327.73	4356.06
Leith, Nev.	888.85	2916.17	Moorcroft, Wyo.	1282.44	4207.47
Kyle, Nev.	985.01	3231.65	Wessex, Wyo.	1285.76	4218.36
Elgin, Nev.	1055.21	3461.97	Rozet, Wyo.	1306.00	4284.77
Boyd, Nev.	1156.86	3795.46	Minturn, Wyo.	1340.84	4399.07
Stine, Nev.	1226.16	4022.83	Gillette, Wyo.	1384.48	4542.25
Caliente, Nev.	1337.60	4388.44	Sparta, Wyo.	1447.00	4747.37
Eccles, Nev.	1407.28	4617.05	Oriva, Wyo.	1417.57	4650.81
Minto, Nev.	1466.13	4810.13	Kier, Wyo.	1352.04	4435.82
Big Springs, Nev.	1544.50	5067.25	Felix, Wyo.	1290.69	4234.54
Islen, Nev.	1593.66	5228.53	Echeta, Wyo.	1243.44	4079.52
Barclay, Nev.	1619.52	5313.37	Croton, Wyo.	1206.13	3957.11
Acoma, Nev.	1682.64	5520.46	Lariat, Wyo.	1180.58	3873.29
Brown, Nev.	1760.95	5777.38	Arvada, Wyo.	1113.92	3654.58
Crestline, Nev.	1823.10	5981.29	Kendrick, Wyo.	1179.50	3869.74
Lien, Nev.	1768.22	5801.23	Cadiz, Wyo.	1138.89	3736.51
Utah-Nevada Line	1730.32	5678.89	Huntley, Mont.	922.60	3026.90
Uvada, Utah	1723.98	5656.09	Ballantine, Mont.	915.26	3002.82
Tomas, Utah	1684.62	5526.96	Anita, Mont.	931.71	3056.78
Modena, Utah	1666.64	5467.97	Corinth, Mont.	940.62	3086.02
Escalante, Utah	1615.98	5301.76	Toluca, Mont.	988.49	3243.07
Morton, Utah	1578.55	5178.96	Perissa, Mont.	909.44	2983.72
Beryl, Utah	1571.20	5155.04	Hardin, Mont.	884.87	2903.11
Sahara, Utah	1586.86	5206.22	Dunmore, Mont.	904.20	2966.53
Ford, Utah	1570.72	5153.27	Crow Agency, Mont.	926.63	3040.12
Lund, Utah	1549.46	5083.52	Carryover, Mont.	952.59	3125.29
Kerr, Utah	1550.45	5086.77	Ionis, Mont.	999.61	3279.55
Latimer, Utah	1547.56	5077.29	Lodgegrass, Mont.	1025.31	3363.87
Nada, Utah	1544.75	5068.07	Little Horn, Mont.	1049.58	3443.50
Thermo, Utah	1535.08	5036.34	Wyola, Mont.	1130.97	3710.52
Laho, Utah	1527.85	5012.62	Aberdeen, Mont.	1203.10	3947.17
Upton, Utah	1519.52	4985.29	Parkman, Wyo.	1307.88	4300.94
Millford, Utah	1511.57	4959.21	Ohlman, Wyo.	1242.40	4076.11
Opal, Utah	1514.58	4969.08	Ranchester, Wyo.	1149.64	3771.78
Buena Vista, Utah	1289.95	4232.11	Riverdale, Wyo.	1126.21	3694.91
Riter, Utah	1287.07	4222.69	Kool, Wyo.	1122.77	3683.62
Garfield, Utah	1288.53	4227.45	Monarch, Wyo.	1111.16	3645.53
Morris, Utah	1336.96	4386.34	Alger, Wyo.	1107.22	3632.00
Shields, Utah	1438.66	4720.00	Tongue River, Wyo.	1111.74	3647.43
Tooele, Utah	1490.79	4891.03	Dietz, Wyo.	1113.20	3652.32
Buehl, Utah	1538.95	5049.04	Sheridan, Wyo.	1137.24	3731.99
Stockton, Utah	1544.98	5068.82	Wakeley, Wyo.	1144.64	3755.37

Table of elevations at railroad stations—Continued.

Place.	Standard elevation.		Place.	Standard elevation.	
	Meters.	Feet.		Meters.	Feet.
<i>Chicago, Burlington & Quincy R. R.—Contd.</i>			<i>Atchison, Topeka & Santa Fe Ry.—Continued.</i>		
Arno, Wyo.	1148.78	3768.96	West Yard, N. Mex.	1970.77	6465.77
Verona, Wyo.	1221.67	4008.09	Gallup, N. Mex.	1982.25	6503.43
Alki, Wyo.	1267.19	4157.44	Zuni, N. Mex.	2013.67	6606.51
Regis, Wyo.	1241.63	4073.58	Wingate, N. Mex.	2055.39	6743.39
Clearmont, Wyo.	1194.03	3917.41	Perea, N. Mex.	2088.92	6853.40
<i>Atchison, Topeka & Santa Fe Ry.:</i>			Guam, N. Mex.	2133.33	6999.10
Goffs, Cal.	787.66	2584.18	Gonzales, N. Mex.	2209.78	7249.92
Rising, Cal.	736.07	2414.92	Thoreau, N. Mex.	2174.88	7135.42
Homer, Cal.	650.15	2133.03	Chaves, N. Mex.	2132.17	6995.29
Bannock, Cal.	539.57	1770.24	Baca, N. Mex.	2077.30	6815.27
Ibis, Cal.	443.42	1454.79	Bluewater, N. Mex.	2022.15	6634.34
Klinefelter, Cal.	370.83	1216.63	Toltec, N. Mex.	1995.52	6546.97
Java, Cal.	293.53	963.02	Grants, N. Mex.	1970.37	6464.45
Hartoun, Cal.	219.59	720.44	Horace, N. Mex.	1926.70	6321.18
Needles, Cal.	147.22	483.00	McCarty, N. Mex.	1879.69	6166.95
Beal, Cal.	147.55	484.09	Alaska, N. Mex.	1841.35	6041.16
Topock, Ariz.	154.07	505.48	Cubero, N. Mex.	1807.30	5929.45
Powell, Ariz.	232.99	764.40	Laguna, N. Mex.	1767.05	5797.40
Franconia, Ariz.	337.22	1106.36	El Rito, N. Mex.	1726.48	5664.29
Haviland, Ariz.	446.66	1465.42	Armijo, N. Mex.	1698.80	5573.48
Yucca, Ariz.	549.94	1804.26	Suwanee, N. Mex.	1662.67	5454.94
Signal, Ariz.	651.69	2138.09	Garcia, N. Mex.	1597.71	5241.82
Kaster, Ariz.	719.85	2361.71	Rio Puerco, N. Mex.	1539.06	5049.40
Drake, Ariz.	797.71	2617.15	Pavo, N. Mex.	1547.23	5076.20
Hancock, Ariz.	844.82	2771.71	Cortez, N. Mex.	1614.23	5296.02
McConico, Ariz.	905.55	2970.96	Sandia, N. Mex.	1611.21	5286.11
Maguire, Ariz.	919.16	3015.61	Manzana, N. Mex.	1545.15	5069.38
Kingman, Ariz.	1016.73	3335.72	Isleta, N. Mex.	1492.40	4896.32
Louise, Ariz.	1067.94	3503.73	Barr, N. Mex.	1498.00	4914.69
Berry, Ariz.	1029.14	3376.44	Abajo, N. Mex.	1507.26	4945.07
Antares, Ariz.	1099.72	3608.00	Albuquerque, N. Mex.	1510.06	4954.25
Hackberry, Ariz.	1083.14	3553.60	<i>Chicago, Rock Island & Pacific Ry.:</i>		
Tinnaka, Ariz.	1154.56	3787.92	El Reno, Okla.	414.30	1359.25
Crozier, Ariz.	1210.49	3971.42	Choctaw Crossing, Okla.	406.44	1333.46
Truxton, Ariz.	1281.47	4204.29	Reno Junction, Okla.	405.98	1331.95
Cherokee, Ariz.	1362.39	4469.77	Fort Reno, Okla.	408.79	1341.17
Peach Springs, Ariz.	1459.84	4789.49	Calumet, Okla.	418.48	1372.96
Nelson, Ariz.	1556.19	5105.60	Geary, Okla.	468.65	1537.56
Yampai, Ariz.	1700.85	5580.20	Bridgeport, Okla.	435.03	1427.26
Fields, Ariz.	1642.71	5389.46	McCool, Okla.	441.79	1449.44
Pica, Ariz.	1599.37	5247.27	Hydro, Okla.	454.31	1490.52
Audley, Ariz.	1572.55	5159.27	Weatherford, Okla.	500.80	1643.04
Chino, Ariz.	1623.39	5326.07	Indianapolis, Okla.	507.08	1663.64
Seligman, Ariz.	1597.84	5242.25	Washita, Okla.	455.50	1494.42
Pan, Ariz.	1672.98	5488.77	Frisco Junction, Okla.	454.52	1491.20
Crookton, Ariz.	1734.63	5691.03	Clinton, Okla.	462.55	1517.55
Gled, Ariz.	1661.80	5452.09	Parkersburg, Okla.	464.97	1525.49
Pineveta, Ariz.	1559.04	5114.95	Foss, Okla.	495.91	1627.00
Ash Fork, Ariz.	1567.82	5143.76	Canute, Okla.	580.94	1905.97
Holmes, Ariz.	1679.02	5508.58	Elk City, Okla.	583.69	1914.99
Fairview, Ariz.	1809.14	5935.49	Merritt, Okla.	625.29	2051.47
McClellan, Ariz.	1960.04	6430.56	Doxey, Okla.	560.12	1837.66
Supai, Ariz.	2117.08	6945.79	Sayre, Okla.	552.53	1812.76
Williams, Ariz.	2061.01	6761.83	Hext Ranch, Okla.	588.73	1931.52
Davern, Ariz.	2127.26	6979.18	Erick, Okla.	627.90	2060.04
Chalender, Ariz.	2093.76	6869.28	<i>Chicago, Rock Island & Gulf Ry.:</i>		
Maine, Ariz.	2159.11	7083.68	Texola, Tex.	655.66	2151.11
Arey, Ariz.	2193.09	7195.16	Benonine, Tex.	653.71	2144.71
Bellemont, Ariz.	2173.85	7132.04	Fuller, Tex.	665.33	2182.84
Riordan, Ariz.	2228.44	7311.14	Shamrock, Tex.	710.63	2331.46
Agassiz, Ariz.	2166.76	7108.78	Lela, Tex.	736.20	2415.35
Flagstaff, Ariz.	2101.80	6895.65	Ramsdell, Tex.	781.65	2564.46
Cliffs, Ariz.	2081.59	6829.35	McLean, Tex.	871.45	2859.08
Cosmino, Ariz.	1970.77	6465.77	Alamogordo, Tex.	927.41	3042.68
Winona, Ariz.	1903.23	6244.18	Rockledge, Tex.	965.41	3167.35
Angell, Ariz.	1801.22	5909.50	Jericho, Tex.	976.30	3203.08
Hibbard, Ariz.	1690.85	5547.40	<i>Texas & Pacific Ry.:</i>		
Canyon Diablo, Ariz.	1654.77	5429.02	Benbrook, Tex.	202.73	665.12
Sunshine, Ariz.	1628.05	5341.36	Iona, Tex.	293.08	961.55
Dennison, Ariz.	1527.26	5010.69	Earle, Tex.	276.53	907.25
Moqui, Ariz.	1513.62	4965.93	Lambert, Tex.	352.89	1157.77
Winslow, Ariz.	1479.59	4854.29	Bennets, Tex.	229.89	754.23
Hobson, Ariz.	1487.25	4879.42	Santo, Tex.	250.87	823.06
Hardy, Ariz.	1506.24	4941.72	Judd, Tex.	279.48	916.93
Manila, Ariz.	1510.73	4956.45	Mingus, Tex.	290.70	953.74
Joseph City, Ariz.	1523.60	4998.68	Strawn, Tex.	305.81	1003.31
Penzance, Ariz.	1540.11	5052.84	Wiles, Tex.	354.49	1163.02
Holbrook, Ariz.	1548.27	5079.62	Ranger, Tex.	439.07	1440.51
Aztec, Ariz.	1568.99	5147.59	Eastland, Tex.	436.82	1433.13
Carrizo, Ariz.	1593.80	5228.99	Lem, Tex.	458.70	1504.92
Adamana, Ariz.	1615.01	5298.58	Cisco, Tex.	493.53	1619.19
Bibo, Ariz.	1647.04	5403.66	Dothan, Tex.	493.76	1619.94
Pinta, Ariz.	1682.62	5520.40	Putnam, Tex.	489.35	1605.48
Navajo, Ariz.	1716.99	5633.16	Chataqua, Tex.	465.61	1527.59
Chambers, Ariz.	1753.71	5753.63	Baird, Tex.	523.89	1718.80
Sanders, Ariz.	1778.70	5835.62	Clyde, Tex.	606.29	1989.14
Querino, Ariz.	1798.62	5900.97	Abilene, Tex.	524.14	1719.62
Houck, Ariz.	1817.99	5964.52	Tye, Tex.	548.93	1800.95
Allantown, Ariz.	1845.58	6055.04	Merkel, Tex.	570.56	1871.91
Lupton, Ariz.	1879.05	6164.85	Trent, Tex.	583.83	1915.45
Manuelito, N. Mex.	1907.95	6259.67	Eskota, Tex.	591.68	1941.20
Defiance, N. Mex.	1943.70	6376.96	Sweetwater, Tex.	609.29	2000.30

Table of elevations at railroad stations—Continued.

Place.	Standard elevation.		Place.	Standard elevation.	
	Meters.	Feet.		Meters.	Feet.
<i>Texas & Pacific Ry.—Continued.</i>			<i>Atchison, Topeka & Santa Fe Ry.:</i>		
Roscoe, Tex.	727.81	2387.82	Haney, Tex.	1110.50	3643.37
Lorraine, Tex.	690.97	2266.96	Canyon, Tex.	1088.51	3571.22
Colorado, Tex.	650.92	2069.94	Lester, Tex.	1118.25	3686.79
Westbrook, Tex.	650.66	2134.71	Umbarger, Tex.	1148.52	3768.10
Itan, Tex.	675.00	2214.56	Dawn, Tex.	1159.03	3802.58
Coahoma, Tex.	735.32	2412.46	Hereford, Tex.	1102.66	3814.49
Big Spring, Tex.	731.82	2400.98	Joel, Tex.	1148.87	3769.25
Morita, Tex.	754.39	2475.03	Summerfield, Tex.	1221.42	3997.28
Stanton, Tex.	811.98	2663.97	Black, Tex.	1217.60	3994.74
Germania, Tex.	838.79	2751.93	Friona, Tex.	1221.62	4007.28
Midland, Tex.	846.48	2777.16	Parmerton, Tex.	1273.71	4178.83
Warfield, Tex.	874.76	2869.94	Bovina, Tex.	1240.31	4069.25
Odessa, Tex.	882.84	2896.45	Wilsey, Tex.	1271.07	4170.17
Douro, Tex.	940.23	3084.74	Texico, N. Mex.	1263.17	4144.25
Judkins, Tex.	880.16	2887.66	Clovis, N. Mex.	1277.94	4264.95
Metz, Tex.	871.57	2859.48	Blacktower, N. Mex.	1317.02	4320.92
Sand Hills, Tex.	826.02	2710.03	St. Vrain, N. Mex.	1240.03	4068.33
Monahans, Tex.	799.22	2622.11	Melrose, N. Mex.	1339.38	4394.28
Aroya, Tex.	813.03	2667.42	Cantara, N. Mex.	1344.42	4410.82
Pyote, Tex.	799.07	2621.62	Krider, N. Mex.	1314.33	4312.10
Quito, Tex.	815.66	2676.04	Tolar, N. Mex.	1283.57	4211.18
Barstow, Tex.	781.91	2565.32	Taiban, N. Mex.	1257.85	4126.80
Pecos, Tex.	787.62	2584.05	La Lande, N. Mex.	1254.96	4117.31
Hermosa, Tex.	832.58	2731.58	Fort Summer, N. Mex.	1239.02	4065.02
Toyah, Tex.	888.90	2914.36	Agudo, N. Mex.	1299.46	4263.31
Gomez, Tex.	998.98	3277.49	Ricardo, N. Mex.	1344.23	4410.19
San Martine, Tex.	1133.41	3718.53	Evanola, N. Mex.	1396.02	4580.11
Kent, Tex.	1283.78	4211.87	Largo, N. Mex.	1515.60	4972.43
Boracho, Tex.	1359.11	4459.01	Yeso, N. Mex.	1455.07	4773.84
Plateau, Tex.	1202.37	3944.78	Buchanan, N. Mex.	1564.22	5131.94
Wild Horse, Tex.	1173.99	3851.67	Cardenas, N. Mex.	1614.68	5297.50
Van Horn, Tex.	1233.71	4047.60	Duoro, N. Mex.	1658.76	5442.11
Allamore, Tex.	1386.94	4550.32	Cassus, N. Mex.	1715.13	5627.09
Eagle Flat, Tex.	1359.91	4461.64	Iden, N. Mex.	1774.18	5820.79
Sierra Blanca, Tex.	1377.12	4518.10	Vaughn, N. Mex.	1816.55	5959.80
<i>Galveston, Harrisburg & San Antonio Ry.:</i>			Tejon, N. Mex.	1853.90	6082.34
Etholen, Tex.	1418.47	4653.76	Carnero, N. Mex.	1898.20	6227.68
Lasca, Tex.	1365.61	4480.34	Encino, N. Mex.	1864.46	6116.98
Torcer, Tex.	1302.74	4274.07	Negra, N. Mex.	1890.21	6218.46
Finlay, Tex.	1204.27	3951.01	Pedernal, N. Mex.	1941.50	6369.74
Tinaja, Tex.	1173.35	3849.57	Dunmoor, N. Mex.	1942.93	6374.43
Madden, Tex.	1119.36	3672.43	Lucy, N. Mex.	1883.60	6179.78
Nulo, Tex.	1088.36	3570.73	Sillo, N. Mex.	1855.55	6087.75
Fort Hancock, Tex.	1095.93	3595.56	Willard, N. Mex.	1880.02	6102.41
Iser, Tex.	1121.82	3680.50	Broncho, N. Mex.	1925.20	6316.26
Polvo, Tex.	1114.90	3657.80	Mountainair, N. Mex.	1979.47	6494.31
Tornillo, Tex.	1093.18	3586.54	Abo, N. Mex.	1873.57	6146.87
Fabens, Tex.	1103.26	3619.61	Scholle, N. Mex.	1774.38	5821.44
Belen, Tex.	1113.84	3654.32	Sais Crusher, N. Mex.	1678.34	5506.35
Ysleta, Tex.	1118.48	3669.59	Sais, N. Mex.	1658.32	5440.67
Alfalfa, Tex.	1125.52	3692.64	Becker, N. Mex.	1576.05	5170.76
<i>Chicago, Rock Island & Gulf Ry.:</i>			Bodega, N. Mex.	1536.33	5040.44
Groom, Tex.	995.02	3264.49	Madrone, N. Mex.	1488.34	4882.59
Lark, Tex.	1028.63	3374.76	Belen, N. Mex.	1464.82	4805.83
Conway, Tex.	1054.19	3458.62	Los Lunas, N. Mex.	1479.21	4853.04
Royal, Tex.	1097.05	3599.24			

DESCRIPTIONS OF BENCH MARKS.*

GENERAL NOTES DESCRIBING DIFFERENT FORMS AND MARKINGS OF BENCH MARKS CONNECTED WITH THE LEVEL NET.

The notes in Precise Leveling in the United States, 1903-7, describing the various types of bench marks, have been reproduced in this publication, and the numbering has not been changed in any case. In order that the series may remain intact, some notes are included in the list which refer to bench marks described only in previous publications. Observers should adhere to these notes in describing their bench marks and should use the corresponding numbers in their descriptions.

NOTE 1.—This type of bench mark is the red metal disk designed by the Coast and Geodetic Survey, lettered "U. S. Coast and Geodetic Survey, B. M. \$250 fine or imprisonment for disturbing this mark." The disk is 3 inches in diameter, with a 3-inch tenon upon the back for setting it, and is set in cement flush with a horizontal or vertical surface. In the latter case a horizontal mark cut on it, or the horizontal mark of a cross, is the bench mark.

NOTE 2.—This type of bench mark has the same lettering as that referred to in note 1, and is a 3-inch red metal cap, somewhat curved, screwed upon a 4-foot or 4½-foot iron pipe set in the ground and usually cemented at the base, from 4 to 6 inches being exposed above the ground. The base of the pipe is split and spread to a diameter of about a foot. For placing the foot of the level rod accurately a square or a small circle was cut in outline in the center of the cap.

NOTE 3.—This type of bench mark is a stone post 4 feet long set in the ground with 6 inches exposed, and this portion is dressed. The upper surface is 6 inches square and plane, being marked in the center with a ½-inch copper

*Any person who finds that one of the bench marks here described is disturbed, or that the description is not in accordance with the facts, is requested to notify the Superintendent of the Coast and Geodetic Survey, Washington, D. C.

bolt, 2 inches long, set flush with the surface; the top of the bolt is the bench mark; the upper surface of the stone is lettered "U. S. B. M." and when the post is set near the railroad these letters face the track.

NOTE 4.—This type of bench mark is a brass or copper bolt, usually set in lead or cement, flush with a horizontal or vertical surface. In the latter case, a horizontal mark cut on the face of the bolt, or the horizontal mark of a cross, is the bench mark.

NOTE 5.—This type of bench mark is the bottom of a hole in a horizontal surface, 25 millimeters square, 4 millimeters deep, lettered "U. S. B. M."

NOTE 6.—Where a hydrant has been used the bench mark is the highest point, a brass nut used as a check valve. These may not be considered stable points. They are, however, the most accurately defined of the city bench marks.

NOTE 7.—Bench marks referred to this note are upon a Coast and Geodetic Survey triangulation station mark or witness mark, a terra cotta pipe filled and surrounded with concrete, from which projects the point of a nail. The bench mark is a square hole cut near the nail.

NOTE 8.—This type of bench mark is the smooth bottom of a round cut, or shallow drill hole, 8 millimeters deep and 25 millimeters in diameter, in a horizontal stone surface.

NOTE 9.—Bench marks referred to this note are upon a Coast and Geodetic Survey triangulation station mark, a terra cotta pipe filled and surrounded with concrete, from which projects the point of a nail, against which the rod was held.

NOTE 10.—Bench marks referred to this note consist of a copper bolt in a bench mark stone, set 4 feet underground, covered by a 3-inch iron pipe marked "U. S. B. M."

NOTE 11.—The bottom of hole about 25 millimeters square and about 4 to 5 millimeters deep, cut in the top of a stone or cement post about 4 feet long and with rectangular top from 4 to 8 inches on a side, projecting about 6 inches from the ground. The top of the post is lettered "U. S. B. M." Limestone posts are used between Holland and New Braunfels, Tex., and black lava posts between Pocatello and Owyhee, Idaho.

NOTE 12.—The top of a copper bolt cemented in the top of a 4-foot reinforced concrete post, 7 inches square, with edges beveled, projecting about 6 inches from the ground, with the top marked "U. S. B. M."

NOTE 13.—The surface within an outlined square, 1 inch on each side, on a horizontal surface of masonry or metal, unlettered.

NOTE 14.—The surface within an outlined square, 1 inch on each side, on a horizontal surface of masonry, lettered "U. S."

NOTE 15.—The bottom of a hole in a horizontal surface, 25 millimeters square and 4 to 6 millimeters deep, lettered "U. S."

NOTE 16.—The bottom of a hole in a horizontal surface, 25 to 30 millimeters square, 4 millimeters deep, not lettered.

NOTE 17.—A 3-inch aluminum or bronze disk* lettered "U. S. Geological Survey B. M. \$250 fine or imprisonment for disturbing this mark. Elevation above sea — feet. Datum —." Each disk is stamped with the approximate elevation in feet and a letter or letters to indicate the datum plane. This elevation and the datum letter or letters usually form the name by which the bench mark is designated in this publication.

NOTE 18.—This type of bench mark has the same lettering as that referred to in note 17, and is a 3-inch aluminum or bronze cap riveted upon a 3-inch iron pipe, set in the ground, 5 to 6 inches being exposed above the ground. A cross cut in the center of the top is the bench mark.

NOTE 19.—A bench mark referred to this note was established by the Corps of Engineers, U. S. Army. It is the top of a long section of iron rail driven in the center of the railroad track on the south jetty, Galveston, Tex.

NOTE 20.—A cross on the top of a section of rail set vertically in the ground. Those designated "M. M." (mile monument) mark the exact mile which is indicated by the numeral following; the others are designated "R. M." (rail monument).

NOTE 21.—A bench mark of the Baltimore and Ohio Railroad, being a section of rail, sometimes marked with a cross, set vertically between the tracks; when there are several tracks it is set between the rails of the main track.

NOTE 22.—A bench mark of the Baltimore and Ohio Railroad, consisting of a section of rail set vertically in the ground near the track. It is to the right, when proceeding from Warwick, Ohio, to Wheeling, W. Va.

NOTE 23.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in an abutment of a bridge. It is in the right-hand end of the farther abutment, when proceeding from Cumberland, Md., toward Wheeling, W. Va.

NOTE 24.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt in the bridge seat of an abutment. It is in the right-hand end of the bridge seat of the farther abutment, when proceeding from Cumberland, Md., toward Wheeling, W. Va.

NOTE 25.—This type of bench mark is a square post of concrete made of Portland cement and fine gravel, of the grade called artificial stone, somewhat finer than that of which sidewalk blocks are made. It is 4 feet long, projecting 3 inches above the ground, 6 inches square at the base, and 4 inches square at the top, with a copper bolt set flush with the top surface, which is lettered "U. S. B. M."

NOTE 26.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in a culvert or bridge. It is in the farther end of the right-hand coping, when proceeding from Cumberland, Md., toward Wheeling, W. Va.

* See illustration on p. 550, Appendix 8, Report for 1899; and U. S. Geological Survey Report, 1896-97, Part I, pp. 226-228; also bulletins of the U. S. Geological Survey giving the results of leveling in the various States.

NOTE 27.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in rock in place, on the left-hand side of the track when proceeding from Cumberland, Md., toward Wheeling, W. Va.

NOTE 28.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in rock in place, on the right-hand side of the track when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 29.—A bench mark of the Baltimore and Ohio Railroad, consisting of a section of rail set vertically in the ground on the left-hand side of the track, when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 30.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in the end of the bridge seat of a bridge. When proceeding from Foley, Pa., toward Chicago Junction, Ohio, it is in the right-hand end of the nearer of the two abutments of the bridge.

NOTE 31.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in the end of the bridge seat of a bridge. When proceeding from Foley, Pa., toward Chicago Junction, Ohio, it is in the right-hand end of the farther of the two abutments of the bridge.

NOTE 32.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in an abutment of a bridge or culvert. It is on the right-hand end of the nearer abutment when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 33.—A bench mark of the Baltimore and Ohio Railroad, consisting of a copper bolt set in an abutment of a bridge or culvert. It is on the right-hand end of the farther abutment when proceeding from Foley, Pa., toward Chicago Junction, Ohio.

NOTE 34.—This type of bench mark is a stone post of Sioux quartzite, or so-called pink jasper, 4 feet long, set in the ground with 6 inches exposed, and this portion is rough dressed. The upper surface is 6 inches square, being marked in the center with a $\frac{3}{8}$ -inch copper bolt, 2 inches long, set flush with the surface; the top of the bolt is the bench mark; the upper surface of the stone is lettered "U. S. B. M." and when the post is set near the railroad these letters face the track.

NOTE 35.—The bottom of a hole 1 inch square and about $\frac{1}{4}$ inch deep, cut in the top of a reinforced concrete post, 4 feet long and 7 inches square, projecting about 6 inches above the ground. The top of the post is lettered "U. S. B. M."

NOTE 36.—This type of bench mark is a $\frac{3}{8}$ -inch copper bolt, 2 inches long, set in lead or cement, flush with a horizontal or vertical surface, lettered "U. S." In the latter case, a horizontal mark on the face of the bolt is the bench mark.

NOTE 37.—A bench mark referred to this note was described by the Baltimore and Ohio Railroad as "a copper bolt set as described above in foundation for P. & L. E. R. R. signal bridge." The reference "as above" is to the description of B. & O. 359A, immediately preceding: "Copper bolt set in a concrete foundation of P. & L. E. R. R. signal bridge * * * in the more easterly of two northern pedestals." In the original descriptions of all the Baltimore and Ohio Railroad bench marks the expressions "easterly," "northerly," etc., referred to the general direction of the railroad and not to the actual direction at the point.

NOTE 38.—These bench marks were set and located geodetically in the winter of 1892-93, and their geographical positions are published in Report of 1893, pages 3608-3619.

Each stone-line bench mark consists of a vitrified tile 18 by 18 by 4 inches. A copper bolt is leaded vertically in the center of this tile, the upper end projecting slightly above face of tile. On the surface of the tile surrounding the bolt is the inscription "Mississippi River Commission."

U. S.
B. M.
1893.

The tile is buried in the ground from 18 to 40 inches deep, the depth varying with the nature of the material.

On top of the tile a 4-inch wrought-iron gas pipe 4 feet long is set concentric with the copper bolt. The lower end of the pipe is expanded and fits in a circular groove molded in the tile. A cast-iron cap fits over the top of the pipe and is fastened thereto with bronze bolts. The top of the cap bears an inscription similar to that on the tile. (See Report of Chief of Engineers for 1894, Part 5, p. 2768.)

NOTE 39.—All bench-mark monuments referred to as pipestone benches consist of pieces of limestone 46 centi-

U S
meters square and 15 centimeters thick, marked °, with spherical-headed copper bolts leaded in upper faces, and
B M

buried 1.2 meters under ground, access being given through 12-centimeter iron pipes set on top. Each pipe has a
USE
cast-iron cap, fastened by a horizontal bolt through cap and pipe. The cap has a small boss and the letters °

B M
raised on top. Elevations apply to the top of the bolt in the underground stone. Elevation of boss of pipe cap can be found in any case by adding 1.24 meters to elevation of copper bolt. (See Report of Chief of Engineers for 1902, Part 2, p. 1467.)

NOTE 40.—All bench-mark monuments referred to as pipe-flange benches consist of 4-centimeter gas pipes about 1.6 meters long, capped at upper end and having a 12-centimeter circular flange attached near lower end by lock nuts. Monuments are set with about 0.1 meter above ground surface. Flanges are surrounded in the usual case by a

matrix of neat cement, approximately doubling the bearing area of the monument. Elevations apply to the top of cap. (See Report of Chief of Engineers for 1902, Part 2, p. 1467.)

NOTE 41.—A permanent bench mark (P. B. M.) referred to this note consists of a $\frac{3}{8}$ -inch copper bolt leaded vertically into the center of the dressed upper surface of a limestone block 18 inches square by about 6 inches thick. The bolt projects a little above the surface of the stone, on which are inscribed the words "Ill. River U. S. Survey 1903." This stone is set about 3.5 feet below the level of the ground, with its upper surface in a horizontal position. On the top of the stone so placed is set vertically and concentric with the copper bolt a 3-inch wrought-iron pipe 4 feet long, split at the bottom, and expanded into two flat foot-like bases which rest on the stone and also serve to prevent the pipe from being pulled up. A nipple, having an external diameter equal to the internal diameter of the pipe and being of sufficient length to extend from the stone up into the pipe a short distance above the split, is placed at the bottom of the pipe to prevent the earth from closing around the copper bolt. A cast-brass cap fits over the top of the pipe, to which it is riveted by two bolts at right angles to each other passing through the pipe and the flange of the cap. On the top of the cap is inscribed in sunken letters, "Illinois River Survey. \$250 fine for disturbing this mark. 1903. U. O. S. Latitude \square . Longitude \square . Elevation above sea \square ." Two elevations are obtained for such benches—the elevation of the top of the copper bolt in the stone in the ground and the elevation of the center mark, between the letters "U" and "S," on the top of the cap. (See Document No. 263, House of Representatives, 59th Cong., 1st sess.)

NOTE 42.—A bench mark referred to this note is the highest point in a square cut in stone and marked thus:

U \square S

NOTE 43.—A bench mark referred to this note consists of a copper bolt leaded vertically into stone, the top of the bolt being the bench mark. It is lettered thus:

U S
○
P B M

NOTE 44.—A bench mark referred to this note is the center of a cross (+) cut on the cross section or end of a piece of railway rail set vertically in the ground.

NOTE 45.—A bench mark referred to this note is the highest point in a square cut in a stone surface and marked:

S D
 \square
P B M

NOTE 46.—A bench mark referred to this note is center punch mark in the end of a copper bolt leaded into stone, and lettered:

S D
○
P B M

NOTE 47.—A bench mark referred to this note is similar to that described in note 46 except it is lettered "U. S. P. B. M." instead of "S. D. P. B. M."

NOTE 48.—The bench marks in the line Fort Adams to Vicksburg, 1905-6, were said to be "the regulation tile pipe and bronze cap used by the Mississippi River Commission for some years." They were therefore of the same type as those described in the Report of the Chief of Engineers for 1900, Part 7, as follows: "The new precise bench marks established on lines Biloxi, Miss., to New Orleans, La., and Baton Rouge, La., to Fort Adams, Miss., are of the B. M. form as used in 1898 above St. Paul, Minn., for ordinary bench marks, and consist of tile and pipe as follows: A vitrified tile 18 by 18 by 4 inches, in the center of which is set vertically with lead a three-eighths inch copper bolt, the upper end being a little above the upper surface of the tile. Surrounding the bolt on the surface of the tile is the inscription, 'Mississippi River Commission, 1898, U. S. B. M.' This tile is buried in the ground about 3 feet beneath the surface. On top the tile is placed a 4-inch wrought-iron gas pipe 4 feet long, concentric with copper bolt; the lower end of the pipe is split into quarters and spread out to prevent its being pulled up. A cast brass cap fits over the top of the pipe and is riveted thereto. The cap has the following inscription in sunken letters: 'Mississippi River Commission, \$250 fine for disturbing this mark, 1898, P. B. M. U. S., latitude \square , longitude \square , elevation above sea \square .' The cap is put on with a prick punch. The elevation of the top of the cap is determined; the structure has thus two bench marks."

NOTE 49.—A bench mark referred to in this note is the top of a copper bolt set vertically in the top of a truncated square pyramid of concrete built below the ground surface and surmounted by a square cast-iron cover with removable lid.

NOTE 50.—A 3-inch aluminum or bronze disk* lettered "U. S. Geological Survey B. M. \$250 fine or imprisonment for disturbing this mark."

NOTE 51.—This type of bench mark is a 3-inch aluminum or bronze cap* (lettered as in note 50) riveted upon a 3-inch iron pipe set in the ground.

NOTE 52.—This type of bench mark is a plain iron cap, marked with a chisel "U + S" and screwed upon a 4-foot or 4½-foot iron pipe set in the ground. The base of the pipe is usually split and spread to a diameter of about a foot and set in cement.

NOTE 53.—A type of bench mark set by the Missouri River Commission, and consisting of a 4-inch iron pipe, 4 feet long, resting on a stone about 18 inches square and projecting about 6 inches above the ground. The pipe has

* See footnote on page 163.

bolted to its top a cast-iron cap, marked with a triangle raised about $\frac{3}{8}$ inch above the surface; at the center of the triangle there is a copper bolt.

NOTE 54.—This type of bench mark is a 3-inch aluminum or bronze disk lettered "U. S. Reclamation Service B. M. \$250 fine or imprisonment for disturbing this mark. Elevation above sea level — feet. Datum —." The elevation and datum are stamped on the bench mark, and it is referred to in the same manner as in Note 17.

NOTE 55.—This type of bench mark is the upper flat end of a section of railroad rail, from 2 to $2\frac{1}{2}$ feet long, set in stones with 4 to 6 inches exposed. The upper end of the rail is stamped with a cross and the letters "U. S. B. M."

NOTE 56.—A copper bolt set, usually with lead, into stone or brick, with the letters "U. S. B. M." surrounding the bolt. When the bolt is set in a vertical support, the exact point defined by the bench mark is indicated by a horizontal line or by the intersection of cross lines on the head of the bolt in a horizontal surface; otherwise the top of the bolt is the bench mark.

NOTE 57.—A copper bolt set, usually with lead, into stone or brick; its head is divided into quadrants by cross lines, each quadrant containing one of the letters "U. S. B. M." The intersection of the cross lines is the bench mark.

NOTE 58.—A bench mark of the Union Pacific Railroad, being a spike in a milepost or mile pole, the number of which is part of the designation of the bench mark.

NOTE 59.—A brass plate, 10 centimeters in diameter, cemented into stone or brick flush with the surface. The raised center is marked by cross lines, the intersection of which is the bench, and by the letters "U. S. B. M."

NOTE 60.—A type of bench mark set by the U. S. Army Engineers. It consists of a concrete slab 16 by 16 by 4 inches set about 3 feet in the ground. A copper bolt is embedded in the concrete slab, which is also surmounted by an iron pipe 4 inches in diameter and 4 feet long with a cap bolted to its top. The center of the cap is directly above the bolt in the slab. Elevations are usually taken on both the bolt and the center of the cap.

NOTE 61.—A type of bench mark set by the U. S. Army Engineers. It consists of an iron pipe, 3 inches in diameter and 5 feet long, set $4\frac{1}{2}$ feet into the ground and covered with a cap. Elevations are taken on the knob of the cap.

DESCRIPTIONS OF PERMANENT BENCH MARKS FROM RED DESERT TO AZUSA, WYO., 1903.

Z₂.—Near *Red Desert, Sweetwater County, Wyo.* (Appendix 3, Report for 1903, p. 805).—The bench mark has been moved slightly since it was determined in 1903.

B₃.—At *Red Desert, Sweetwater County, Wyo.* (Appendix 3, Report for 1903, p. 805).

C₃.—At *Tipton, Sweetwater County, Wyo.*, 75 feet north of the center of the main tracks, in line with the west end of the depot.† (Note 11*.)

D₃.—About 1 mile east of *Table Rock, Sweetwater County, Wyo.*, on the first deck plate-girder bridge east of Table Rock, about $4\frac{1}{2}$ telegraph poles west of mile pole 773, on the south end of the east abutment (concrete), a square hole about 18 inches from retaining wall and 16 feet from outer edge and end of horizontal surface.† (Note 5*.)

U. P. 779.—Near *Monell, Sweetwater County, Wyo.*† (Note 58*.)

E₃.—At *Monell, Sweetwater County, Wyo.*, directly opposite the station sign, 12 feet west of the second telegraph pole east of mile pole $779\frac{1}{2}$, 42 feet south of the main tracks.† (Note 11*.)

F₃.—At *Bitter Creek, Sweetwater County, Wyo.*, in the station park, 18 feet from the south fence and 18 feet from the east fence, 2 rails west of the west end of the depot, and 53 feet north of the center of the main track.† (Note 11*.)

G₃.—About 2 miles east of *Black Buttes, Sweetwater County, Wyo.*, about 2 telegraph poles east of the half-mile post $791\frac{1}{2}$, on a through plate-girder bridge, on the south side of the east wall, on the top of the stone extending from under the retaining wall.† (Note 5*.)

U. P. 793.—At *Black Buttes, Sweetwater County, Wyo.*† (Note 58*.)

H₃.—At *Hallville, Sweetwater County, Wyo.*, directly opposite mile pole 799, about 100 yards west of the section house and 4 rails east of the car house, 78 feet south of the center of the main track and 34 feet south of the fence.† (Note 11*.)

U. P. 799.—At *Hallville, Sweetwater County, Wyo.*† (Note 58*.)

U. P. 804.—Near *Point of Rocks, Sweetwater County, Wyo.*† (Note 58*.)

I₃.—One mile west of *Point of Rocks, Sweetwater County, Wyo.*, between the fourth and fifth telegraph poles west of mile pole $805\frac{1}{2}$, 4 rails west of the station whistle post and 7 rails east of a small trestle at the point of curvature of the first curve west of Point of Rocks, 45 feet north of the track and 8 feet south of the fence.† (Note 11*.)

U. P. 810.—Near *Point of Rocks, Sweetwater County, Wyo.*† (Note 58*.)

J₃.—Two miles east of *Salt Wells, Sweetwater County, Wyo.*, 9 rails west of mile pole $814\frac{1}{2}$, which also marks the junction of sections 45 and 46, near the middle of the first curve east of Salt Wells, 75 feet south of the center of the track.† (Note 11*.)

U. P. 823.—Near *Baxter, Sweetwater County, Wyo.*† (Note 58*.)

K₃.—At *Baxter, Sweetwater County, Wyo.*, 5 rails west of the telegraph station, and 1 rail east of the third telegraph pole east of mile pole $823\frac{1}{2}$, 132 feet south of the main track.† (Note 11*.)

L₃.—At *Rock Springs, Sweetwater County, Wyo.*, on the north side of the depot, in the water table, 22 inches above the surface of the ground, and 22 inches from the northwest corner of the bay window; a square cut lettered U. S. B. M.†

M₃.—At *Rock Springs, Sweetwater County, Wyo.*, in the west end of the Union Pacific Railroad park west of the passenger depot, about 12 feet from the west fence, in line with the three hydrants of the park. (Note 11*.)

N₃.—At *Rock Springs, Sweetwater County, Wyo.*, in the stone wall of the City Hall, 6 inches from the pillar at the north side of west entrance, 4 feet above the surface of the ground. (Note 56*.)

* See pp. 162-166.

† This bench mark is on the Union Pacific Railroad.

O₃.—At *Rock Springs, Sweetwater County, Wyo.*, in the stone wall of the high school building, on the north side, 40 feet west of the northeast corner, and 6 feet west of the north entrance; 6 feet above the surface of the ground, and 16 inches above and to the left of the first window west of the north entrance. (Note 56.)*

U. P. 835.—At *Ah Say, Sweetwater County, Wyo.*† (Note 58.)*

P₃.—About 1¾ miles east of *Wilkins, Sweetwater County, Wyo.*, 15 rails east of the east side of pump house, and 45 feet south of the center of the track, in line with the telegraph poles.† (Note 11.)*

U. P. 839.—At *Wilkins, Sweetwater County, Wyo.*† (Note 58.)*

Q₃.—At *Green River, Sweetwater County, Wyo.*, in the west end of the Union Pacific Railroad park, about equidistant from north and south sides and 12 feet from the fence. (Note 11.)* Stone broken in shipment and cemented together.

R₃.—At *Green River, Sweetwater County, Wyo.*, in the sandstone water table of the county courthouse, 4 feet north of the southeast corner, about 4 feet above the surface of the ground. (Note 56.)*

S₃.—At *Green River, Sweetwater County, Wyo.*, in the west wall of the Sweetwater Brewing Company's stone office and saloon, about 16 inches from the southwest corner, and about 4 feet from the ground. (Note 56,* except the letters U. S. B. M. were below the bolt.)

T₃.—At *Green River, Sweetwater County, Wyo.*, on the Union Pacific Railroad bridge over Green River, on south end of the middle red sandstone pier.† (Note 5.)*

U₃.—Near *Peru, Sweetwater County, Wyo.*, between the sixth and seventh telegraph poles east of the office pole at Peru, 45 feet south of the center of the track, 5 feet from the railroad fence, and 5 feet from the crossing fence.† (Note 11.)* The stone post is 3 feet 6 inches in the ground, projecting 1 foot, and of this depth 16 inches is rock.

V₃.—Two miles west of *Bryan, Sweetwater County, Wyo.*, two telegraph poles east of C signpost, three rails east of a small stone culvert, and between the eighth and ninth telegraph poles west of mile pole 860; 70 feet north of the railroad track and 30 feet south of the railroad fence.† (Note 11.)*

W₃.—Between *Bryan and Marston, Sweetwater County, Wyo.*, about 4 telegraph poles west of mile pole 863, at the north end of the sandstone abutment of the Union Pacific Railroad bridge over Black River, on the top stone of the retaining wall, 8 inches from the west side of the stone and 6 inches from the north end. (Note 5.)*

X₃.—Two and one-eighth miles west of *Marston, Sweetwater County, Wyo.*, 1¾ miles east of *Azusa, Wyo.*, 10 feet south of the fourth telegraph pole west of mile pole 868, 3 poles west of the station sign for Azusa, 55 feet south of track, and 45 feet from the railroad fence.† (Note 11.)*

Y₃.—Four and three-fourths miles east of *Granger* and 1¼ miles west of *Azusa, Sweetwater County, Wyo.*, on the north end of the red sandstone retaining wall of the Union Pacific Railroad bridge over Black River, in the top of the stone, 10 inches from the east edge and 10 inches from the capstone.† (Note 5.)*

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OGDEN, UTAH, AND AZUSA, WYO., 1903.

Transit.—On a low hill west of *Ogden, Weber County, Utah*, near the San Pedro, Los Angeles & Salt Lake Railroad and about 2000 feet from Weber River, on the site where Wheeler Observatory formerly stood. Two sandstone piers, about 5 feet above ground, are still standing, and the bench mark is a square cut on the top of the eastern one.

A.—At *Ogden, Weber County, Utah*, on the iron railway bridge across the Weber River, northeast of the site of Wheeler Observatory; a square cut on the northeast corner of the east abutment.

B.—At *Ogden, Weber County, Utah*, on the corner of Twenty-fourth Street and Wall Avenue, on the east side of the brick building occupied by F. J. Kiesel, wholesale grocer; near the southeast corner, in the stone water table. (Note 57.)*

C.—At *Ogden, Weber County, Utah*, on the corner of Twenty-fifth Street and Wall Avenue, on the brick and stone building occupied by the Healy Hotel; on the west side, 1 foot from the southwest corner. (Note 57.)*

D.—At *Uinta, Weber County, Utah*, 60 feet east of the large gate across the tracks from the railroad station, 30 feet south of the road and 4 feet north of the fence.† (Note 11.)*

E.—On the second iron bridge east of *Devils Gate, Morgan County, Utah*, ½ mile from the station sign; a square cut on the top of the northeast abutment.†

F.—On the second iron bridge west of *Strawberry, Morgan County, Utah*, a square cut in the top of the southeast corner of the east abutment.†

G.—One and one-third miles west of *Morgan, Morgan County, Utah*, at mile pole 1008; a square cut in the stone culvert on the south side of the Union Pacific Railroad tracks.

H.—At *Morgan, Morgan County, Utah*, 100 yards west of the depot, in the space south of the track, halfway between the street and the track.† (Note 11.)*

I.—On the first iron bridge east of *Croydon, Morgan County, Utah*, at the foot of the "Devil's Slide"; a square cut in the top of the southeast corner of the east abutment.†

J.—At *Echo, Summit County, Utah*, south of the tracks, directly opposite the water tank, in the field halfway between the easterly section house and the white cottage of the station agent, three feet from the fence.† (Note 11.)*

Geol. Echo.—At *Echo, Summit County, Utah*, at the east side of a wagon road at the south end of the main street, just under a high hill; an iron post marked with a cross, established by the United States Geological Survey.

K.—Four and one-half miles east of *Echo, Summit County, Utah*, and 4½ miles west of *Emory, Summit County, Utah*; a square cut in the northeast corner of the east abutment of an iron bridge.†

L.—At *Emory, Summit County, Utah*, in a field 100 yards south of the water tank and 50 feet north of the railroad track.† (Note 11.)*

* See pp. 162-166.

† This bench mark is on the Union Pacific Railroad.

M.—At *Castle Rock, Summit County, Utah*, near a fence, 200 feet north of the Union Pacific Railroad tracks and directly opposite the depot. (Note 11.)*

N.—At *Wasatch, Summit County, Utah*, on the side of a hill, a little north of the road, directly behind the depot, 100 yards north of the Union Pacific Railroad tracks. (Note 11.)*

O.—A square cut in the first stone culvert west of *Wyuta, Rich County, Utah*, 200 yards west of the station sign, 25 feet south of the Union Pacific Railroad tracks.

6770 Evanston.—At *Evanston, Uinta County, Wyo.*, in the front yard of the Pacific Hotel, in the corner of the yard west of the walk, about 19 feet south of the south rail of the south track; an iron post marked 6770, established by the United States Geological Survey.†

6779 Evanston.—At *Evanston, Uinta County, Wyo.*, in the south part of the courthouse grounds, 6 feet north of the south fence, nearly in line with the east face of the courthouse; a tablet set in the top of a stone post and marked 6779, established by the United States Geological Survey.

A₆.—At *Evanston, Uinta County, Wyo.*, in the stone corner post on the southeast corner of the depot, in the east face, a few inches from the corner, and 4 feet from the ground.† (Note 57.)*

B₆.—At *Knight, Uinta County, Wyo.*, 100 yards east of the station and in line with the front of the section house, 150 paces south of the mail stand and the Union Pacific Railroad tracks. (Note 11.)*

C₆.—At *Altamont, Uinta County, Wyo.*, near the west entrance of the "Aspen Tunnel," south of the tracks, opposite a point on the track halfway between the station and the section house, about 100 yards from the track, near the right of way fence.† (Note 11.)*

D₆.—At *Springvalley, Uinta County, Wyo.*, 100 feet west of the water tank, 40 feet north of the Union Pacific Railroad tracks. (Note 11.)*

E₆.—At *Leroy, Uinta County, Wyo.*, 200 yards east of the section house, in the Union Pacific right of way south of the tracks, 2 feet from the fence, and nearly opposite the roadway which leads up the hill on the other side of the tracks. (Note 11.)*

F₆.—At *Bridger, Uinta County, Wyo.*, 200 feet northwest of mile pole 914, in the right of way, 80 feet north of the Union Pacific Railroad tracks and north of the station sign, 6 feet from the fence. (Note 11.)*

G₆.—Three miles east of *Bridger, Uinta County, Wyo.*, in a culvert at mile pole 911; a square cut in the top stone on the arch north of the tracks.†

H₆.—At *Carter, Uinta County, Wyo.*, west of the station and opposite mile pole 904; a square cut in the south-southeast base stone of the water tank.†

I₆.—At *Carter, Uinta County, Wyo.*, on the west side of the roadway leading up the hill, 400 feet north of the Union Pacific Railroad tracks, 5 feet west of a telephone pole. (Note 11.)*

J₆.—At *Elkhurst, Uinta County, Wyo.*, in the Union Pacific right of way, 150 feet north of the tracks and at a deflection angle of 45° with the tracks from a point at the east switch of the siding. (Note 11.)*

K₆.—One and two-thirds miles west of *Hampton, Uinta County, Wyo.*, in the south arch of a stone culvert; a square cut on the top of the southwest corner.†

L₆.—At *Church Buttes, Uinta County, Wyo.*, southwest of the station, 4 feet south of the second telegraph pole west of the depot, 100 feet south of the Union Pacific Railroad tracks. (Note 11.)*

M₆.—At *Church Buttes, Uinta County, Wyo.*, a square cut in the south-southwest base stone of the water tank.†

N₆.—At *Garrett, Uinta County, Wyo.*, directly opposite the station sign, 200 feet north of the tracks, about halfway between the tracks and the fence.† (Note 11.)*

O₆.—On the first iron bridge west of *Granger, Sweetwater County, Wyo.*, over Black Fork, in the northeast red sandstone abutment; a square cut on a shelf about 1 foot below the track level.†

P₆.—At *Granger, Sweetwater County, Wyo.*, 100 paces north of main tracks opposite a point 40 paces west of the west water tank.† (Note 11.)*

Y₃.—Near *Azusa, Sweetwater County, Wyo.* (See p.167.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OGDEN, UTAH, AND POCATELLO, IDAHO, 1903.

B.—At *Ogden, Weber County, Utah*. (See p. 167.)

P.—At *Hot Springs, Boxelder County, Utah*, one-third of a mile south of mile pole 9,400 feet south of the cattle guard south of the station, in the right of way of the Oregon Short Line Railroad, 40 feet east of the tracks. (Note 11.)*

Q.—At *Willard, Boxelder County, Utah*, behind the depot and on a line with the south side of the depot, 100 feet east of the tracks and 10 feet east of the wagon road.† (Note 11.)*

R.—At *Brigham, Boxelder County, Utah*, 50 feet south of the second road crossing north of the station, in a field west of the tracks, inside and 2 feet from the fence, very nearly halfway between mile poles 21 and 22, and 5 or 6 feet above the level of the tracks.† (Note 11.)*

S.—At *Honeyville, Boxelder County, Utah*, 450 feet south of the south cattle guard and 30 feet north of the south switch, in the right of way of the Oregon Short Line Railroad, east of the tracks, 7 feet from the fence. (Note 11.)*

T.—At *Dewey, Boxelder County, Utah* (post office, Deweyville), 600 feet south of the depot, in the right of way of the Oregon Short Line Railroad, east of the tracks, 50 feet from the main tracks. (Note 11.)*

U.—At *Bear River, Boxelder County, Utah*, near the entrance to Bear River Canyon, behind the second telegraph pole north of the station sign, 75 feet west of the main tracks.† (Note 11.)*

* See pp. 162-166.

† This bench mark is on the Union Pacific Railroad.

‡ This bench mark is on the Oregon Short Line Railroad.

V.—At *Cache Junction, Cache County, Utah*, on the foundation of the water tank, in the northernmost of the two foundation stones parallel to the tracks.† (Note 57.)*

W.—At *Cache Junction, Cache County, Utah*, opposite the north end of the long curve, between the guy-wire pole and the telegraph pole, the first pole north of mile pole 49.† (Note 11.)*

X.—At *Ransom, Cache County, Utah*, 300 feet south of the north switch of the siding, 8 feet back of the second telegraph pole south of mile pole 57, 35 paces west of the main tracks.† (Note 11.)*

Y.—In *Cache County, Utah*, about 150 feet south of the depot at *Cornish*, through which passes the State line between Utah and Idaho, in the foundation of the water tank; a square cut in the northernmost of the two foundation stones parallel to the tracks.†

A.—At *Weston, Oneida County, Idaho*, 100 feet west of the tracks and 400 feet north of the road leading to the town.† (Note 11.)*

B.—At *Dayton, Oneida County, Idaho*, in the northwest corner of a plat of ground adjacent to the station sign and mail stand, 10 feet east of the sidetrack and nearly opposite the first pole north of mile pole 71, 100 feet east of the whistle post.† (Note 11.)*

C.—At *Garner, Oneida County, Idaho*, in the foundation of the water tank; a square cut in the northernmost of the two foundation stones parallel to the tracks.†

D.—At *Garner, Oneida County, Idaho*, 135 paces west of the tracks, opposite the station sign, 10 feet from the wire fence.† (Note 11.)*

E.—Near *Oxford, Bannock County, Idaho*, in the yard of an abandoned creamery, 12 feet south of the gate, 30 paces east of the main tracks.† (Note 11.)*

F.—3.7 miles north of *Swan Lake, Bannock County, Idaho*, at mile pole 88, 1 foot north of the white fence on the north side of the first road crossing the tracks south of the hill, known as "Red Rock," in the angle made by the main right-of-way fence and the roadway fence, 100 feet east of the tracks.† (Note 11,* except that the post is set nearly flush with the ground.)

G.—At *Downey, Bannock County, Idaho*, in the southwest corner of the Commercial Hotel yard, 5 feet from the south and west fences, 100 yards east of the railway station.† (Note 11.)*

H.—At *Marsh Valley, Bannock County, Idaho*, opposite a point on the tracks 150 feet north of the station sign, 180 feet northwest of the semaphore, and 100 feet west of the tracks.† (Note 11.)*

I.—At *McCammon, Bannock County, Idaho*, opposite a point on the tracks 150 feet north of the station, 20 feet southeast of the third telephone pole north of the schoolhouse, 225 feet west of the tracks, 4 feet from the fence on the west side of the main highway.† (Note 11.)*

J.—About 1 mile north of *Onyx, Bannock County, Idaho*, near the signboard "One mile to Onyx," west of the third telegraph pole south of mile pole 197, 24 feet west of the right-of-way fence on the west side of the tracks.† (Note 11.)*

K.—At *Inkom, Bannock County, Idaho*, in the foundation of the water tank in the westernmost of the two foundation stones parallel to the tracks; a square cut in the southeast corner.†

L.—At *Inkom, Bannock County, Idaho*, near the first telegraph pole west of the station, 50 feet south of the tracks, between the guy wire and the mail pole.† (Note 11.)*

M.—At *Portneuf, Bannock County, Idaho*, 4 feet south of the telephone pole opposite the midpoint between the two east switches of the siding, 60 feet north of the tracks, 10½ feet north of the north right of way fence.† (Note 11.)*

A₃.—At *Pocatello, Bannock County, Idaho*. (See below.)

B₃.—*Pocatello, Bannock County, Idaho*. (See below.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN POCATELLO AND OWYHEE, IDAHO, 1903.

A₃.—At *Pocatello, Bannock County, Idaho*, in the south end of the railroad park east of the Oregon Short Line Railroad tracks, opposite the Oregon Short Line Hotel, about 35 feet south of the hydrant for the park, and about 12 feet from the south end fence, in line with the center row of trees. (Note 11.)*

B₃.—At *Pocatello, Bannock County, Idaho*, in the sloping surface of the white lavatic water table of the Masonic Temple, about 16 inches from the large side display window of the hardware store on the first floor of the building, about 12 feet from the northwest corner and about 18 inches above the sidewalk; a square hole lettered U. S. B. M.

C₃.—At *Pocatello, Bannock County, Idaho*, on the south end of the stone schoolhouse west of the Oregon Short Line Railroad tracks, in the sandstone water table, 6 feet from the ground and 12 feet from the southeast corner. (Note 56.)*

City.—At *Pocatello, Bannock County, Idaho*, on the rock sill of the entrance to the Pioneer Block on West Center Street.

D₃.—At *Pocatello, Bannock County, Idaho*, in the lava foundation of the county courthouse, about 30 inches east of the northwest corner, opposite the corner of Fifth and Clark Streets, about 4 inches above the surface of the ground; a square hole lettered U. S. B. M.

E₃.—At *Pocatello, Bannock County, Idaho*, in the southwest corner of the public school building east of the Oregon Short Line Railroad tracks, about 5 feet east of the southwest corner, and about 5 feet 6 inches from the ground, opposite the corner of Sixth Avenue and Clark Street. (Note 56.)*

F₃.—Four miles west of *Pocatello, Bannock County, Idaho*, on the top of the east retaining wall on the north side of the concrete abutment of a deck plate-girder bridge, the first bridge with concrete abutment west of Pocatello; 8 inches from the west edge of wall and 1 foot from the north end.† (Note 5.)*

* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

G₃.—Two and one-half miles west of *Michaud, Oneida County, Idaho*, 15 feet west of the first pole east of mile pole 225, at the beginning of the first cut west of Michaud, 45 feet south of the center of the track, and 5 feet north of the railroad fence, in line with the telegraph poles.† (Note 11.*)

H₃.—At *Bunnock, Oneida County, Idaho*, 4 telegraph poles west of the station sign, and 25 rails east of west switch stand, 75 feet south of the center of the track, and 25 feet south of the fence.† (Note 11.*)

I₃.—About 2½ miles east of *American Falls, Oneida County, Idaho*, between the third and fourth telegraph poles east of mile pole 237, 40 feet north from the railroad fence, 60 feet south from the center of track, and 12 feet south of line of telegraph poles.† (Note 11.*)

O. S. L.—At *American Falls, Oneida County, Idaho*, on top of southeast corner of southeast capstone of water-tank foundation.†

O. S. L.—Near *American Falls, Oneida County, Idaho*, on bridge 217, over Snake River, on southwest corner of stone abutment at east end.†

J₃.—About ¾ of a mile west of *American Falls, Oneida County, Idaho*, on the north side of the track, on the capstone of the west abutment of the Oregon Short Line Railroad bridge over Snake River, 10 inches from north end and 1 foot from east edge of sandstone cap. (Note 5.*)

K₃.—One-half mile east of *Napati, Blaine County, Idaho*, 20 feet west of mile pole 247, 50 feet south of the center of the track, and 50 feet from the fence, in line with the telegraph poles.† (Note 11.*)

L₃.—Three miles east of *Wapi, Blaine County, Idaho*, 150 feet north of the center of the track and 50 feet north of the railroad fence.† (Note 11.*)

O. S. L.—At *Wapi, Blaine County, Idaho*, on southeast corner of southeast capstone of tank foundation.†

M₃.—Three miles west of *Wapi, Blaine County, Idaho*, opposite the west end of the first curve west of Wapi, 85 feet north of the center of the track, 15 feet inside the Oregon Short Line Railroad fence. (Note 11.*)

N₃.—One mile west of *Yale (siding), Blaine County, Idaho*, 70 feet south of the center of the tracks, 30 feet north of the railroad fence, and 21 feet south of the line of telegraph poles.† (Note 11.*)

O. S. L.—At *Minidoka, Lincoln County, Idaho*, on southeast corner of southeast capstone, tank foundation.†

O₃.—At *Minidoka, Lincoln County, Idaho*, directly behind mile pole 273, which is also the boundary of sections 40 and 41, 4 telegraph poles west of the office pole, 54 feet south of the pole, and 100 feet south of the tracks.† (Note 11.*)

P₃.—About 6 miles west of *Minidoka, Lincoln County, Idaho*, and about 1½ miles east of *Colburn, Idaho*, opposite the second telegraph pole west of mile pole 279, about 60 feet north of the center of the tracks.† (Note 11.*)

Q₃.—Four miles west of *Colburne* and about 5 miles east of *Kimama, Lincoln County, Idaho*, 30 feet south of mile pole 284½, and 85 feet south of the center of the tracks.† (Note 11.*)

O. S. L.—At *Kimama, Lincoln County, Idaho*, on southeast corner of southeast capstone of water-tank foundation.†

R₃.—At *Kimama, Lincoln County, Idaho*, 10 rails east of the station semaphore, 120 feet south of the center of the tracks, directly behind and 65 feet south of the pole marking the boundary line between sections 42 and 43.† (Note 11.*)

S₃.—At *Senter, Lincoln County, Idaho*, 7½ poles west of mile pole 296, directly north of the station sign, 45 feet north of the center of the tracks.† (Note 11.*)

T₃.—At *Owinza, Lincoln County, Idaho*, in the foundation of the Oregon Short Line Railroad water tank, in the top of the southwest corner of the southeast white sandstone cap. (Note 5.*)

U₃.—About 4 miles west of *Owinza, Lincoln County, Idaho*, about 30 feet east of the second telegraph pole west of mile pole 308, about 9 feet south of the line of telegraph poles and about 75 feet south of the railroad tracks.† (Note 11.*)

V₃.—At *Dietrich, Lincoln County, Idaho*, directly opposite and 54 feet south of the station sign, 66 feet south of the center of the tracks, and 15 feet south of the line of telegraph poles.† (Note 11.*)

W₃.—At *Shoshone, Lincoln County, Idaho*, in the sandstone capstone of the foundation of the Oregon Short Line Railroad water tank, in the northeast corner of the interior column on the north side. (Note 5.*)

X₃.—At *Shoshone, Lincoln County, Idaho*, in the northwest corner of the courthouse yard, in line with the row of trees along the west side, about 50 feet south of the northwest corner, and 5 feet from the fence inclosing the yard. (Note 11.*)

Y₃.—At *Shoshone, Lincoln County, Idaho*, in the red lavatic water table of the highschool building, 5 feet east of the northwest corner of the building, and 4 feet from the ground. (Note 56.*)

Z₃.—One mile east of *Tunupa, Lincoln County, Idaho*, 12 feet south of mile pole 330, opposite the station signal for Tunupa, and 70 feet south of the center of tracks.† (Note 11.*)

A₄.—At *Tunupa, Lincoln County, Idaho*, 14 rails west of the west end of the siding, 11 poles east of mile pole 332, on the first bridge west of Tunupa, a bridge of the through plate-girder type with concrete abutments and sandstone caps and steps; in a corner of the third step on the south side of the west abutment.† (Note 5.*)

B₄.—At *Gooding, Lincoln County, Idaho*, 2 rails west of the station sign, 10 feet east of the second pole west of mile pole 338, 60 feet south of center of tracks.† (Note 11.*)

C₄.—At *Fuller, Lincoln County, Idaho*, about 7 poles east of mile pole 345, 60 feet south of center of tracks, 4 feet south of the line of telegraph poles.† (Note 11.*)

D₄.—At *Bliss, Lincoln County, Idaho*, in the west end of the small railroad park west of the water tank, and nearly opposite mile pole 351, 3½ rails east of the station semaphore, and 20 feet north of the center of the main track.† (Note 11.*)

E₄.—At *Ticeska, Lincoln County, Idaho*, 4 rails east of the station sign, 45 feet east of the fifth pole east of mile pole 358 and the third pole east of the one marking the boundary line between Lincoln and Elmore counties; in line with the telegraph poles, and about 60 feet south of the center of the tracks.† (Note 11.*)

* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

F₄.—At *King Hill, Elmore County, Idaho*, $3\frac{1}{2}$ rails east of the station sign, 10 feet east of the fifth pole east of mile pole 366, in line with the poles, and 40 feet south of the center of the tracks.† (Note 11.*)

G₄.—At *Glenns Ferry, Elmore County, Idaho*, in the center of the west end of the Oregon Short Line Railroad park west of the depot, about 8 feet inside of the west fence. (Note 11.*)

H₄.—At *Glenns Ferry, Elmore County, Idaho*, on the Oregon Short Line Railroad water tank, about 2 blocks south of the depot, and about halfway to the river, where the pumping plant is located; on the northwest corner of the sandstone cap of the lava foundation for the northwest pillar supporting the tank. (Note 5.*)

I₄.—About 4.6 miles west of *Glenns Ferry, Elmore County, Idaho*, about $\frac{1}{2}$ pole east of mile pole 379 and 60 feet north of the center of the tracks.† (Note 11.*)

J₄.—At *Medbury, Elmore County, Idaho*, directly opposite the station sign, 135 feet north of the center of the main track and 90 feet north of the line of telegraph poles.† (Note 11.*)

K₄.—At *Chalk Spur, Elmore County, Idaho*, directly behind mile pole 391, 120 feet north of the center of the main track and 70 feet north of the line of telegraph poles.† (Note 11.*)

L₄.—Six miles east of *Mountain Home, Elmore County, Idaho*, about 33 feet west of mile pole 398, which also marks the boundary of sections 58 and 59, 150 feet north of the center of the tracks and 54 feet north of the line of telegraph poles.† (Note 11.*)

M₄.—At *Mountain Home, Elmore County, Idaho*, on the foundation of the Oregon Short Line Railroad water tank, in the southeast corner of the southeast capstone, 5 inches from the south and 5 inches from the west side. (Note 5.*) After this bench mark was established it was learned that the tank was likely to be removed within a few years.

N₄.—At *Mountain Home, Elmore County, Idaho*, in the east end of the Oregon Short Line Railroad Park, about equidistant from north and south fences and about 6 feet from east fence. (Note 11.*)

O₄.—At *Mountain Home, Elmore County, Idaho*, at the left-hand side of the Canyon Street entrance to the office of the Turner Hotel, in the sandstone water table, about $2\frac{1}{2}$ feet above sidewalk and 8 inches from corner of stone. (Note 56.*)

P₄.—About $5\frac{1}{2}$ miles west of *Mountain Home, Elmore County, Idaho*, about 20 feet west of the first pole east of mile pole 409 $\frac{1}{2}$, about 60 feet north of the center of the tracks, in line with the telegraph poles.† (Note 11.*)

Q₄.—At *Cleft, Elmore County, Idaho*, opposite the station sign, 1 pole west of mile pole 415, 120 feet south of the tracks.† (Note 11.*)

R₄.—About 3 miles east of *Orchard, Ada County, Idaho*, on a concrete culvert, about $3\frac{1}{2}$ poles east of mile pole 422, about 1 foot from the retaining wall and 1 foot from the edge of the abutment.† (Note 5.*)

S₄.—About $2\frac{1}{2}$ miles west of *Orchard, Ada County, Idaho*, 5 feet south of mile pole 428, 55 feet north of the center of the tracks, and south of Orchard Farm fence.† (Note 11.*)

T₄.—About 1 mile east of *Owyhee, Ada County, Idaho*, 5 feet north of mile pole 436, and about 45 feet south of the center of the tracks.† (Note 11.*)

U₄.—Three-fourths of a mile east of *Owyhee, Ada County, Idaho*, in the capstone of the south end of the east abutment of an Oregon Short Line Railroad bridge, about 14 inches from end of stone and equidistant from the sides. (Note 5.*)

V₄.—At *Owyhee, Ada County, Idaho*, 3 poles east of the station sign, 10 feet west of mile pole 437, 60 feet south of the center of the tracks, in line with the telegraph poles.† (Note 11.*)

W₄.—At *Owyhee, Ada County, Idaho*, in the surface of the southwest corner of the capstone for the southwest column supporting the Oregon Short Line Railroad water tank, about 3 inches from the south edge and 4 inches from the west edge of the stone. (Note 5.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN HOLLAND AND NEW BRAUNFELS, TEX., 1903-4.

X₄.—At *Holland, Tex.* (Appendix 3, Report for 1903, p. 791.)

Z₄.—At *Holland, Tex.* (Appendix 3, Report for 1903, p. 792.)

W₄.—Near *Holland, Tex.* (Appendix 3, Report for 1903, p. 791.)

A₅.—About three-fourths mile north of *Bartlett, Williamson County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 20 feet south of mile pole 902, on the west side of the track, 6 feet east of a telegraph pole and 3 feet east of the barbed wire fence. (Note 11.*)

B₅.—At *Granger, Williamson County, Tex.*, in the southwest corner of the yard of the house of Charles Shoemaker, corner of Commerce and Ash Streets; $2\frac{1}{2}$ feet northeast of the picket fences surrounding the yard and about 140 feet east of the track of the Missouri, Kansas & Texas Railway. (Note 11.*)

C₅.—At *Granger, Williamson County, Tex.*, at the northeast corner of the main entrance to the building of the First National Bank of Granger; a copper bolt, unlettered, leaded vertically in the top of the triangular limestone step, about 6 millimeters below the wearing surface.

D₅.—About two-fifths mile north of *Circleville, Williamson County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 60 meters south of the south abutment of the railway bridge over the San Gabriel Creek; at the railroad water tank, about 2 meters west of the track; the bottom of a square hole, 1 by 1 by $\frac{1}{4}$ inch deep, in the top of the sandstone base of the southeast column, which is 3 feet square and $2\frac{1}{2}$ feet high above ground.

E₅.—At *Taylor, Williamson County, Tex.*, in the grass plot or gore park east of the station of the International & Great Northern Railroad; 25.5 meters east from the east wall of the station and 17.8 meters north from the center of the track nearest the station. (Note 11.*)

* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

F₃.—At *Taylor, Williamson County, Tex.*, in the south wall of the Taylor National Bank, corner of Main and Second Streets, a brick building, with first story granite; 20 feet west of the east entrance; in the wall, 2½ feet above the sidewalk. (Note 57.*)

526 Coupland.—A United States Geological Survey bench mark at *Coupland, Williamson County, Tex.*, opposite the station, 50 feet east of main track of Missouri, Kansas & Texas Railway and 5 feet east of the southwest corner of the fence inclosing the section-house yard; an iron post, marked 526.

G₃.—About one-fourth mile south from *Coupland, Williamson County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, 9½ rails north from mile pole 927; opposite the south end of the first switch west of the main track, about 35 feet west of the main track and 4 feet east of the right-of-way fence. (Note 11.*)

576 S. A.—A United States Geological Survey bench mark at *Elgin, Bastrop County, Tex.*, at Union passenger station, 7 feet east of the southeast corner of a small park, 115 feet east of the crossing of the Missouri, Kansas & Texas Railway and the Houston & Texas Central Railroad, 20 feet north of Houston & Texas Central Railroad main track; an iron post, marked 576 S. A.

K₃.—At *Littig, Travis County, Tex.*, in the southwest corner of the yard of section house 115, almost opposite the east end of the switch and about 8 meters north of the main track of the Houston & Texas Central Railroad; about 1.2 meters north and east, respectively, of the south and west fences bounding the yard. (Note 11.*)

L₃.—At *Manor, Travis County, Tex.*, in the front wall of the brick building facing on the main street of the town, owned by Mr. Harris and occupied by W. H. Richardson, hardware and general merchandise; the center of a cross cut in the face of a copper bolt, unlettered, leaded horizontally into the street facing of the west wall of the building, about 1.4 meters above the sidewalk and about 0.6 meter west of the show window.

M₃.—About 445 meters west of the Houston & Texas Central Railroad depot at *Daffan, Travis County, Tex.*, about 56 meters west of the first cattle guard west of the station; about 1 meter south of the line of telegraph poles and about 7 meters north of the main track. (Note 11.*)

N₃.—About 5½ miles east of the Houston & Texas Central Railroad passenger depot, at *Austin, Travis County, Tex.*, on the west stone abutment of the railway bridge over Walnut Creek; in the top layer of the backing; 1.35 meters north of the main track; the top of a copper bolt leaded vertically into the top of the stone, 0.18 meter west of the east edge, and roughly lettered U. S. B. M.

O₃.—At *Austin, Travis County, Tex.*, in the Driskill Hotel building, corner of Brazos and Sixth Streets; the top of a copper bolt, unlettered, leaded vertically into the top of the limestone step to the first door west of the entrance to the American National Bank; about 1.2 meters from the door and 0.5 meter from the wall.

P₃.—At *Austin, Travis County, Tex.*, in the passenger depot of the Houston & Texas Central Railroad, corner of Congress Avenue and East Third Street; in the south wall, bay projection, just west of the large door of the general truck or baggage room; in the face of the wall about 1.75 meters from the ground and 0.2 meter from the inside corner. (Note 4.*)

Geol. Austin.—A United States Geological Survey bench mark at *Austin, Travis County, Tex.*, in the freight yard of the Houston & Texas Central Railroad, 60 meters west of the office door of the freight depot; an iron post close to a telegraph pole and 5 meters north of the northernmost track.

North Meridian Mark.—At *Austin, Travis County, Tex.*, on Capitol Hill; a cross on the copper bolt in the center of the top of the square stone pillar marking the north end of the meridian line established in 1872.

508 Austin.—A United States Geological Survey bench mark at *Austin, Travis County, Tex.*, on the southwest corner of the post office, facing Colorado Street. (Note 17.*)

476 Austin.—A United States Geological Survey bench mark at *Austin, Travis County, Tex.*, on the highway bridge over Colorado River, in the west end of the south rock pier; a copper bolt, marked 476 feet.

Barton Δ.—About 6 miles W. 19° N. of *Austin, Travis County, Tex.*, on the north side of the Austin and Bee Caves road, on very rough ground, upon a prominent wooded hill, abreast and north of the 8-mile post from Austin. The station mark is a 2-inch iron pipe embedded in and filled with concrete, with a nail projecting from the concrete. The bench mark is a chisel mark on the rim of the iron pipe.

H₃.—At *Elgin, Bastrop County, Tex.*, on the east side of the station of the Missouri, Kansas & Texas Railway and the Houston & Texas Central Railroad, in the brick wall of the bay projection, 4 feet above the ground, 4 inches above the base of the bay window toward the Missouri, Kansas & Texas Railway track, and 2 feet south of the window along the wall. (Note 4.*)

I₃.—About 1¼ miles south of the station at *Elgin, Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 15 feet south from mile pole 936, and 3 feet inside of the west right-of-way fence. (Note 11.*)

J₃.—About one-half mile north of the freight shed or station at *Sayers (Sayersville post office), Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 130 feet north of mile pole 943, 5 feet inside the east right-of-way fence. (Note 11.*)

Q₃.—About 1¾ miles south of *Sayers (Sayersville P. O.), Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, on a large concrete culvert, about 140 meters north of a public road crossing; in the concrete of the culvert in the south corner of the east end, about 0.1 meter from each of the two edges of the corner of the culvert. (Note 4.*)

449 S. A.—A United States Geological Survey bench mark, about 1½ miles south of *Sayers (Sayersville P. O.), Bastrop County, Tex.*, and 8¾ miles north of Bastrop, 4½ telegraph poles south of mile pole 945, 5 feet east of the northwest corner of the right-of-way fence at the public road crossing; an iron post, marked 449 S. A.†

* See pp. 162-166.

† This bench mark is on the Missouri, Kansas & Texas Railway.

R₆.—About 4 miles north of *Bastrop, Bastrop County, Tex.*, along the line of the Missouri, Kansas & Texas Railway, about 70 meters south of mile pole 950; a stone post in the line of telegraph poles, 8.5 meters east of the track and about 6.5 meters west of barbed-wire fence bounding the right of way. (Note 11*, except that the post is but 3 feet long and projects 3 inches.)

460 S. A.—A United States Geological Survey bench mark, 4½ miles north of *Bastrop, Bastrop County, Tex.*, at the crossing of the Bastrop and Elgin public road, 3 feet outside of the southeast corner of the right-of-way fence; an iron post, marked 460 S. A.†

365 S. A.—A United States Geological Survey bench mark, 1.66 miles north of *Bastrop, Bastrop County, Tex.*, at the northeast end of the east rock pier of the bridge over Piney Creek; a copper bolt, marked 365 S. A., in the top of the coping.†

372 Bastrop.—A United States Geological Survey bench mark at *Bastrop, Bastrop County, Tex.*, 100 feet southwest of the freight depot and 50 feet south of the Bastrop and Lagrange County road; an iron post, marked 372.†

Geol. Bastrop.—A United States Geological Survey bench mark at *Bastrop, Bastrop County, Tex.*, in the northeast part of the courthouse grounds, close to the iron fence on the north side of the grounds, and about 15 meters east of the pathway leading to the main entrance to the courthouse; a bronze tablet in the top of a square stone post. The post had been pulled up and reset since it was established.

377 Bastrop.—A United States Geological Survey bench mark at *Bastrop, Bastrop County, Tex.*, at the northwest side of the main entrance to the courthouse; a bronze tablet set in the brick wall, marked 377.

S₆.—At *Bastrop, Bastrop County, Tex.*, on the east side of the county jail, about 1.6 meters south of the northeast corner, and 1.2 meters above the ground; in the plaster-covered brick wall, 0.85 meter north of the window on the east side of the building nearest the northeast corner, and about 0.1 meter below the level of the window sill. (Note 4.)*

T₆.—About 2 miles south of *Bastrop, Bastrop County, Tex.*, on the north stone abutment of the Missouri, Kansas & Texas Railway bridge over Colorado River, 1.2 meters west of main track and 0.3 meter below the top of the rails, in the top of the rough plaster-covered stone wall which forms the backing for the abutment. (Note 4.)*

359 Hills Prairie.—A United States Geological Survey bench mark at *Hills Prairie, Bastrop County, Tex.*, 28 feet east of the south head block, near the right-of-way fence; an iron post, marked 359.†

U₆.—About 2 miles north of *Upton, Bastrop County, Tex.*, on the south stone abutment of the Missouri, Kansas & Texas Railway bridge over Cedar Creek, on the southwest corner; the bottom of a square hole, 1½ inches square and ¼ inch deep, cut in the top stone, about 0.11 meter from the north and east edges, lettered U. S. B. M.

349 Upton.—A United States Geological Survey bench mark at *Upton, Bastrop County, Tex.*, about 45 feet east of the head block at the south end of the switch, near the right-of-way fence; an iron post, marked 349.†

V₆.—About 1½ miles south of *Upton, Bastrop County, Tex.*, on the line of the Missouri, Kansas & Texas Railway, about 420 meters north of mile pole 964; a stone post in the line of telegraph poles on the east side of the track, about midway between the track and the right-of-way fence. (Note 11.)*

329 Smithville.—A United States Geological Survey bench mark at *Smithville, Bastrop County, Tex.*, 10 feet east of the second telegraph pole south of mile pole 969, also the second telegraph pole north of the station; an iron post, marked 329.†

W₆.—At *Smithville, Bastrop County, Tex.*, in the brick building on Main Street owned by Ed. Eagleston and occupied by the American Express Co., in the partition wall between the express office and a barber shop, in a slight recess, 0.22 meter from either edge of the protruding wall and 1.13 meters above the pavement. (Note 4.)*

X₆.—At *Smithville, Bastrop County, Tex.*, in the brick building of the Bank of Smithville, corner of Main and Second Streets, in the wall, 1.2 meters above pavement and 0.3 meter from the edge of the wall at the window on Second Street. (Note 4.)*

Y₆.—At *Smithville, Bastrop County, Tex.*, in the Masonic Building (of brick), corner of Main and Third Streets; the bottom of a square hole, unlettered, cut in the concrete ledge to the window on Third Street, 0.15 meter from the edge of the corner brick pillar and 0.12 meter from the window.

433 S. A.—A United States Geological Survey bench mark about 3½ miles west of *Smithville, Bastrop County, Tex.*, about ¼ mile east of mile pole 972, 25 feet northwest of a road crossing; an iron post, marked 433 S. A. Reported in very poor condition in 1904.†

460 S. A.—A United States Geological Survey bench mark about 4½ miles west of *Smithville, Bastrop County, Tex.*, near the second telegraph pole east of mile pole 974, 65 feet northeast of the road crossing; an iron post in a corner of the fence, marked 460 S. A.†

Z₆.—Near *Rosanky, Bastrop County, Tex.*, in the right of way of the Missouri, Kansas & Texas Railway, 103 meters east of mile post 977 and 48 meters west of a road crossing, in the line of telegraph poles on the south side of the track. (Note 11.)*

512 S. A.—A United States Geological Survey bench mark, 120 yards west of the railroad station at *Rosanky, Bastrop County, Tex.*, 50 feet south of the crossing of the Rosanky and Jeddo public road; an iron post, marked 512 S. A.†

451 S. A.—A United States Geological Survey bench mark, ¼ mile east of the section house at *Hemkens, Bastrop County, Tex.*, 4 miles west of Rosanky and 6 miles east of Red Rock, 45 feet southwest of the settlement road crossing and about halfway between mile poles 983 and 984; an iron post, marked 451 S. A.†

T. B. M. 117.—Just west of *Hemkens, Bastrop County, Tex.*, the bottom of a square hole cut on the red rock base to the column at the northwest corner of the old water tank.†

* See pp. 162-166.

† This bench mark is on the Missouri, Kansas & Texas Railway.

A₆.—About $\frac{3}{4}$ mile west of *Hemkens, Bastrop County, Tex.*, on the right of way of the Missouri, Kansas & Texas Railway, 282 meters west of a water tank near mile pole 984, in a red sandstone culvert, in the northwest corner of the side north of the track, 0.37 meter from the north and west edges. (Note 56.)*

491 S. A.—A United States Geological Survey bench mark at *Red Rock, Bastrop County, Tex.*, 1200 feet southeast of the passenger station on the Lockhart branch of the Missouri, Kansas & Texas Railway, 125 feet south of the track at the intersection of the Waelder and Red Rock and the Red Rock and Rosanky public roads; an iron post, marked 491 S. A. Reported unstable in 1904.

B₆.—At *Bateman, Bastrop County, Tex.*, on the San Antonio branch of the Missouri, Kansas & Texas Railway; 18.6 meters northeast of the signboard "Bateman," and about 18 meters south of Red Rock-Taylorville road and railroad crossing; 4.87 meters from the middle of the south rail, 3.3 meters from the line of telegraph poles; the top of a copper bolt leaded vertically in an outcrop of red sandstone, 1.5 meters long by 0.4 meter wide, by 0.2 meter high, with the letters U. S. cut in the stone below the bolt.

C₆.—Three-fourth mile east of *Dale, Caldwell County, Tex.*, on the right of way of the Missouri, Kansas & Texas Railway, on a red sandstone culvert, 2.3 meters east of mile pole 997; the top of a copper bolt leaded vertically into the center of the top of the upper southwest corner stone, 0.25 meter from the south and west edges of the culvert, roughly lettered U. S. B. M.

D₆.—Two and a half miles east of *Lockhart, Caldwell County, Tex.*, on the right of way of the Missouri, Kansas & Texas Railway, in the west limestone pier of the bridge over Plum Creek; the bottom of a square hole, unlettered, cut in the northwest corner of the top of the southernmost topstone, 0.2 meter from the joint, 0.1 meter from the west edge, and 0.9 meter south of the south rail of the track.

Geol. Lockhart.—A United States Geological Survey bench mark at *Lockhart, Caldwell County, Tex.*, 30 feet south of the track of the Missouri, Kansas & Texas Railway, 200 feet west of the transfer track of the San Antonio & Aransas Pass Railway, and 40 feet west of the road; an iron post. Reported slightly loose in 1904.

E₆.—At *Lockhart, Caldwell County, Tex.*, on the county courthouse; in the east wall, about 1.2 meters from the northeast corner and about 1.2 meters above the ground; about 0.52 meter south of the granite corner stone, and 0.14 meter above the layer of red sandstone; a cross cut in the face of a copper bolt, leaded horizontally into a block of limestone dressed ready for lettering, but not lettered.

F₆.—At *Lockhart, Caldwell County, Tex.*, in the Eugene Clark Library building, about 0.42 meter north of the southeast corner of the front wall of the building, and about 1.2 meters from the ground; a cross in the face of a copper bolt, leaded horizontally into the limestone window ledge, lettered U S C.

G₆.—About $\frac{1}{2}$ mile west of the Missouri, Kansas & Texas Railway depot at *Lockhart, Caldwell County, Tex.*, about 100 meters west of the westernmost switch in the yards, in the line of telegraph poles on the railway right of way, south of the track. (Note 11.)*

Geol. Clear Fork.—A United States Geological Survey bench mark, 400 feet east of the spur at *Clear Fork, Caldwell County, Tex.*, 25 feet north of the center of the track and 50 feet south of the San Marcos and Lockhart road crossing; an iron post. Reported very slightly loose in 1904.†

Geol. Maxwell.—A United States Geological Survey bench mark at *Maxwell, Caldwell County, Tex.*, 30 feet south of the center of the main track, directly in front of the station; an iron post.†

H₆.—About $1\frac{1}{4}$ miles west of *Maxwell, Caldwell County, Tex.*, 38 meters west of milepole 1014, on the right of way of the Missouri, Kansas & Texas Railway; 10 meters south of track. (Note 11.)*

100 S. A.—A United States Geological Survey bench mark about $\frac{5}{8}$ mile west of *Reedville, Caldwell County, Tex.*, 10 feet west of the ninth telegraph pole east of milepole 1018, 40 feet south of the track and 30 feet east of the wagon road; an iron post marked 100 S. A.†

I₆.—At *San Marcos, Hays County, Tex.*, opposite the freight depot of the International & Great Northern Railroad and just south of the track; in the middle of the southeast face of the octagonal limestone base (3 meters high) of the steel water tank, 1 meter above the ground. (Note 4.)*

J₆.—At *San Marcos, Hays County, Tex.*, at the east entrance of the courthouse, in the face of the corner pillar of dressed limestone, about 1.5 meters north from the entrance and 1.5 meters above the ground. (Note 4.)*

K₆.—At *San Marcos, Hays County, Tex.*, in the building of the Glover National Bank, in the top of the limestone ledge step below the window at the left of the entrance, in the center of the step. (Note 4.)*

585 San Marcos.—A United States Geological Survey bench mark near *San Marcos, Hays County, Tex.*, on the International & Great Northern Railroad bridge over San Marcos River, in the west end of the north rock pier; a copper bolt, marked 585 feet.

L₆.—2.8 miles east of *Hunter, Comal County, Tex.*, 25 meters east of milepole 214, on the right of way of the International & Great Northern Railroad, 6 meters south from the track. (Note 11.)*

627 Yorks.—A United States Geological Survey bench mark near *Hunter, Comal County, Tex.*, on the International & Great Northern Railroad bridge over Yorks Creek, near milepole 219, in the top of the west end of the north rock pier; copper bolt, marked 627 feet.

M₆.—1 mile west of *Hunter, Comal County, Tex.*, 210 meters east of milepole 218, opposite post with sign "Hunter, 1 mile," 4.5 meters east of a crossing, on the right of way of the International & Great Northern Railroad. (Note 11.)*

N₆.—200 meters east of *Goodwin, Comal County, Tex.*, opposite the switch block at the east end of the siding, on the right of way of the International & Great Northern Railroad, 16 meters north of the track. (Note 11.)*

* See pp. 162-166.

† This bench mark is on the Missouri, Kansas & Texas Railway.

695 S. A.—A United States Geological Survey bench mark at *Goodwin, Comal County, Tex.*, opposite the station, in the right of way of the International & Great Northern Railroad, 50 meters north of milepole 223 and 12 meters east of the track; an iron post, marked 92 S. A. 695 feet.

T₆.—In *Guadalupe County, Tex.*, about 4 miles southeast of *New Braunfels* on the New Braunfels-Seguin highway, about 10 meters east from the center of the road, in the northwest corner of the front yard of Gottfried Janer, 1 meter from both the north and west yard fences. (Note 11.*)

Seguin West Base Δ .— $6\frac{1}{2}$ miles from *New Braunfels, Comal County, Tex.*, 1100 meters west of the Seguin-New Braunfels road and about 400 meters east of Guadalupe River, on a small hill covered with scattering mesquite brush, on the land of Henry Steinman. The base monument is a limestone block set in concrete and carrying on its top surface a bronze station mark, 80 millimeters in diameter, with an inner circle, countersunk, 37 millimeters in diameter, and the letters "U. S. C. & G. S." cast on the space between the inner and outer circles. The center of the inner circle is the bench mark.

Seguin East Base Δ .—Near *Seguin, Guadalupe County, Tex.*, about 2 miles northwest of Von Beckman's store and gin, 1050 meters east of the main road between Van Beckman's and New Braunfels, on the land of Henry Soefje, at the western edge of the live oak timber. The monument and mark are similar to those at Seguin West Base Δ .

O₆.—1.35 miles east of *New Braunfels, Comal County, Tex.*, in the top of the northeast limestone pier of the bridge of the International & Great Northern Railroad, over Guadalupe River; the bottom of a square hole, unlettered, 0.2 meter from the east edge and 0.6 meter from the north edge of the pier.

638 Comal.—A United States Geological Survey bench mark near *New Braunfels, Comal County, Tex.*, on the International & Great Northern Railroad bridge over Comal Dry Creek, in the top of the north end of the east rock pier; a copper bolt, marked 638 feet.

P₆.—At *New Braunfels, Comal County, Tex.*, on the Opera House (of yellow brick) owned by Louis and Otto Seekatz, about 1.4 meters from the sidewalk, at the base of the window just to the left of the entrance on San Antonio Street. (Note 56.*)

Q₆.—At *New Braunfels, Comal County, Tex.*, in the Comal County prison, at the left of the entrance to the building (of limestone), in the face of the square corner limestone pillar, about 1.5 meters above the sidewalk. (Note 56.*)

R₆.—At *New Braunfels, Comal County, Tex.*, in the square park at the intersection of San Antonio and Seguin Streets, in the northwest part, about 8 meters west of the center line of San Antonio Street, and 20 meters north of the center line of Seguin Street. (Note 11.*)

S₆.—At *New Braunfels, Comal County, Tex.*, in the courthouse (of limestone), in the top of the low limestone wall, top-dressed, at the right of the steps leading to the side entrance on San Antonio Street; the bottom of a square hole, 3 centimeters square and 0.6 centimeter deep, lettered "U. S. C. & G. S."

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OWYHEE, IDAHO, AND HUNTS JUNCTION, WASH., 1904.

V₄.—At *Owyhee, Ada County, Idaho*.—See page 171 of this publication.

W₄.—At *Owyhee, Ada County, Idaho*.—See page 171 of this publication.

X₄.—Three miles east of *Mora, Ada County, Idaho*, on the railroad right of way, 1 telegraph pole east of mile pole 442, 30 meters south of the track, on a limestone post.† (Note 11.*)

Y₄.—At *Mora, Ada County, Idaho*, directly opposite station sign, 2 poles west of mile pole 445, about 22 meters south of the center of the track, on the railroad right of way, on a lava stone post.† (Note 16.*)

Z₄.—About 1 mile west of *Mora, Ada County, Idaho*, $8\frac{1}{2}$ telegraph poles east of mile pole 446 and 4 meters north of the track; in the top of the capstone of a red sandstone culvert, 7.5 centimeters from the north edge and 7.5 centimeters from the west edge.† (Note 16.*)

A₅.—About 2 miles west of *Kuna, Ada County, Idaho*, 20 meters east of mile pole 451, in an offset of the west abutment of bridge 222, south of the track; 35 centimeters from the east edge and 30 centimeters from the south edge.† (Note 16.*)

B₅.—Nearly $2\frac{1}{2}$ miles west of *Kuna, Ada County, Idaho*, $4\frac{1}{2}$ poles east of mile pole 451 $\frac{1}{2}$, in the right of way, about 18 meters south of the center of the track and about 1 meter south of the line of telegraph poles, on a lava stone post.† (Note 16.*)

C₅.—About $3\frac{1}{2}$ miles west of *Kuna, Ada County, Idaho*, on the railroad right-of-way, 2 poles east of mile pole 452 $\frac{1}{2}$ and about 3 meters south of the center of the track in the native rock of a deep lava cut, about 0.7 meter above the ground.† (Note 14.*)

D₅.—About 4 miles east of *Nampa, Canyon County, Idaho*, 3 poles east of mile pole 455, on the right of way, about 27 meters south of the center of the track and about 0.7 meter from the fence, on a sandstone post.† (Note 11.*)

O. S. L.—At *Nampa, Canyon County, Idaho*, east of the station, near mile pole 459, the top of the southeast corner of the southeast capstone supporting a column of the water tank.†

E₅.—At *Nampa, Canyon County, Idaho*, in the west end of the Dewey Palace Hotel lawn, about 4.5 meters from the sidewalk along the west end of the lawn and equidistant from the walks along the sides of the lawn, on a lava stone post. (Note 11.*)

F₅.—At *Nampa, Canyon County, Idaho*, in the west face of the Citizens' State Bank building (of brick), about 25 centimeters from the southwest corner. (Note 4.*)

* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

G₆.—At *Nampa, Canyon County, Idaho*, in the north face of the brick building occupied by the Tuttle Mercantile Co., 0.9 meter from the northeast corner of the building and 1 meter above the ground. (Note 4.*)

H₆.—At *Nampa, Canyon County, Idaho*, in the east face of the brick building occupied by Leeson Furniture Co., 0.2 meter from the northeast corner and 1 meter above the ground. (Note 4.*)

I₆.—At *Nampa, Canyon County, Idaho*, in the brick depot of the Oregon Short Line Railroad, in the top of the lower step at the women's entrance facing the track, 0.15 meter from the west edge and 0.20 meter from the north edge of the step. (Note 16.*)

J₆.—Near *Nampa, Canyon County, Idaho*, opposite the eighth telegraph pole west of mile pole 462, about 5 meters north of the track, in the top of a red sandstone culvert, 0.3 meter from the west edge and 0.15 meter from the north edge of the capstone.† (Note 16.*)

K₆.—About 5 miles west of *Nampa, Canyon County, Idaho*, at mile pole 464, on the railroad right of way, about 18 meters south of the center of the track on a sandstone post.† (Note 11.*)

L₆.—Three-fourths of a mile east of *Caldwell, Canyon County, Idaho*, south of the track, in the west abutment of a bridge, 0.3 meter from the east edge and 0.3 meter from the south edge.† (Note 5.*)

M₆.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by Baker Bros.' grocery, in the face of the west wall, 6 meters from the northwest corner of the building and 1.2 meters above the ground. (Note 4.*)

N₆.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by the Steunenberg Banking & Trust Co., in the face of the west wall, about halfway between the north and south corners of the building and 1.2 meters above the sidewalk. (Note 4.*)

O₆.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by the Saratoga Hotel, in the limestone step of the first door south of the northeast corner of the building, about 0.15 meter from the east edge and 0.1 meter from the south edge. (Note 16.*)

P₆.—At *Caldwell, Canyon County, Idaho*, in the brick building occupied by the First National Bank, in the east wall of the building, 0.6 meter from the southeast corner and 1.2 meters from the ground. (Note 4.*)

Q₆.—One mile west of *Caldwell, Canyon County, Idaho*, 10 meters east of mile pole 469, on the railroad bridge over the Boise River, south of the track, in the top of the west abutment, 0.2 meter from the east edge and 0.2 meter from the south edge.† (Note 16.*)

R₆.—About 2½ miles west of *Caldwell, Canyon County, Idaho*, 5 poles west of mile pole 470½, south of the track, in the offset of the west abutment (of concrete) of bridge 312, 0.3 meter from the south edge and 0.3 meter from the east edge of the abutment.† (Note 16.*)

S₆.—Near *Notus, Canyon County, Idaho*, 3¾ poles west of mile pole 475, in the top of the west wall of a culvert of concrete, 8 meters south of the track, 0.1 meter from the east edge and 0.1 meter from the south edge.† (Note 16.*)

T₆.—About 2 miles west of *Notus, Canyon County, Idaho*, 1 pole west of mile pole 477, 45 meters north of the track, in the southwest corner of the ranch of Asa Anderson, 2.4 meters east of a telephone pole and 6 meters north of the road on a sandstone post.† (Note 11.*)

U₆.—About 2 miles east of *Parma, Canyon County, Idaho*, 4½ poles west of mile pole 481, 6 meters north of the track, in the top of the east wall of the sandstone culvert, 0.1 meter from the north edge and 0.1 meter from the west edge.† (Note 16.*)

O. S. L.—Near *Parma, Canyon County, Idaho*, 1.5 meters west of mile pole 483, section 70, on the right of way, 15 meters south of the track; the top of an iron rod sunk in a concrete bed, projecting 5 centimeters above the ground.†

V₆.—About 2 miles west of *Parma, Canyon County, Idaho*, 4½ poles east of mile pole 485, in the west wall of a sandstone culvert north of the track, 0.2 meter from the east edge and 0.2 meter from the north edge.† (Note 16.*)

W₆.—In *Canyon County, Idaho*, about 3 miles east of *Nyssa, Malheur County, Oreg.*, 6½ poles north of mile pole 487½, on the railroad right of way, 30 meters west of the track, 3 meters north of the road, and 3 meters east of the fence, on a sandstone post.† (Note 11.*)

X₆.—In *Canyon County, Idaho*, about 1¾ miles south of *Nyssa, Malheur County, Oreg.*, in the north (sandstone) abutment of bridge 327 of the Oregon Short Line Railroad over the Boise River; in the top of the offset east of the track, 0.1 meter from the south edge and 0.1 meter from the east edge. (Note 16.*)

F.—About 1 mile south of *Nyssa, Malheur County, Oreg.*, in the north abutment of bridge 328 of the Oregon Short Line Railroad over Snake River; in the sandstone offset east of the track, 0.2 meter from the south edge and 0.25 meter from the east edge. (Note 5.*)

G.—At *Nyssa, Malheur County, Oreg.*, in the capstone (sandstone) of the northeast pillar of the railroad water tank, 0.1 meter from the north edge and 0.1 meter from the east edge.† (Note 16.*)

H.—About 2 miles north of *Nyssa, Malheur County, Oreg.*, on the railroad right of way, opposite mile pole 493, 27 meters east of the track, on a sandstone post.† (Note 11.*)

I.—About 4 miles south of *Ontario, Malheur County, Oreg.*, in the north abutment of bridge 331 of the Oregon Short Line Railroad, 6½ poles south of mile pole 497, 0.2 meter from the west edge, and 0.2 meter from the south edge of the offset, in concrete. (Note 16.*)

J.—About 5 miles south of *Ontario, Malheur County, Oreg.*, one-half pole south of mile pole 496, in a limestone culvert of the Oregon Short Line Railroad, about 6 meters east of the track, 0.07 meter from the east edge, and 0.1 meter from the north edge of the culvert. (Note 16.*)

* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

2143 H.—At *Ontario, Malheur County, Oreg.*, at the corner of Main Street and the street leading to the railroad station, 3.6 meters east of the northeast corner, at the Carter House. (Note 18.*)

K.—At *Ontario, Malheur County, Oreg.*, in the west face of the brick building of the Carter House, 1 meter north of the side door, and 1.5 meters above the ground. (Note 4.*)

L.—At *Ontario, Malheur County, Oreg.*, in the north face of the brick building occupied by the Oregon Forwarding Co., 1.5 meters east (?) of the northeast corner, and 1.5 meters above the ground. (Note 4.*)

M.—At *Ontario, Malheur County, Oreg.*, in the south face of the brick building occupied by Griffin & Staples's dry goods store, 1 meter west of the southeast corner, and 1.5 meters above the ground. (Note 4.*)

N.—About 1 mile north of *Ontario, Malheur County, Oreg.*, in the top of the north abutment of bridge 334 of the Oregon Short Line Railroad over Malheur River, in the top of the sandstone offset, west of the track, 0.35 meter from the west edge, and 0.4 meter from the south edge. (Note 16.*)

Y₅.—Near *Payette, Canyon County, Idaho*, about $1\frac{3}{4}$ miles north of *Ontario, Malheur County, Oreg.*, in the north abutment of bridge 335 of the Oregon Short Line Railroad over the Snake River, east of the track in the sandstone offset, 0.3 meter from the south edge, and 0.35 meter from the east edge. (Note 5.*)

2139 H(1).—2.2 miles south of *Payette, Canyon County, Idaho*, on the right of way of the Oregon Short Line Railroad, 85 meters south of mile pole 503, 3 meters east of the track. (Note 18.*)

Z₅.—About two-fifths mile south of *Payette, Canyon County, Idaho*, in the north abutment of bridge 338 of the Oregon Short Line Railroad over the Payette River, east of the track, in the sandstone offset, 0.35 meter from the east edge, and 0.45 meter from the south edge. (Note 16.*)

A₆.—At *Payette, Canyon County, Idaho*, in the sandstone capstone of the middle pillar on the west side of the railroad water tank, 0.1 meter from the west edge, and 0.1 meter from the south edge.† (Note 16.*)

B₆.—At *Payette, Canyon County, Idaho*, in the north wall of the brick building occupied by the Moss Mercantile Co., 1.2 meters from the ground, and 1.2 meters west of the northeast corner. (Note 4.*)

C₆.—At *Payette, Canyon County, Idaho*, in the north wall of the brick building occupied by the First National Bank, 1.2 meters above the ground, and 1.2 meters west of the northeast corner. (Note 4.*)

2139 H(2).—0.9 mile north of *Payette, Canyon County, Idaho*, on the right of way of the Oregon Short Line Railroad, 8 meters south of mile pole 506, at the fence line west of the track. (Note 18.*)

2123 H.—In *Canyon County, 2.6 miles south of Crystal, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole north of mile pole 509, west of the track. (Note 18.*)

D₆.—About 2.6 miles south of *Crystal, Washington County, Idaho*, 4 poles north of mile pole 509, in a sandstone culvert, east of the track, 0.2 meter from the east edge, and 0.15 meter from the south edge.† (Note 16.*)

2112 H.—6.3 miles south of *Weiser, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole south of mile pole 512, west of the track. (Note 18.*)

E₆.—About $3\frac{1}{2}$ miles south of *Weiser, Washington County, Idaho*, 6 poles south of mile pole 515, in the south abutment of bridge 342, in the offset west of the track, 0.2 meter from the west edge, and 0.12 meter from the north edge.‡ (Note 16.*)

2113 H.—3.3 miles south of *Weiser, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, 1.2 meters north of mile pole 515, west of the track. (Note 18.*)

F₆.—About one-third mile southeast of *Weiser, Washington County, Idaho*, in the top of the north abutment of the bridge over the Weiser River, in the sandstone offset east of the track, about 0.3 meter from the south edge, and about 0.5 meter from the east edge.† (Note 5.*)

2107 H.—At *Weiser, Washington County, Idaho*, at the railroad station, on the north margin of the highway, 9 meters east of the main track of the Oregon Short Line Railroad. (Note 18.*)

G₆.—At *Weiser, Washington County, Idaho*, in the north wall of the brick building occupied by the Masonic Lodge, 3 meters north of the northwest corner (?), and 1.2 meters above the ground. (Note 57.*)

H₆.—At *Weiser, Washington County, Idaho*, in the west wall of the brick courthouse at Oldtown, Weiser, about 1 mile east of the railroad station. (Note 1.*)

2122 H.—3.2 miles southeast of *Eaton, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole west of mile pole 521, south of the track. (Note 18.*)

I₆.—About 1 mile east of *Eaton, Washington County, Idaho*, 6 poles west of mile pole 522½, 27 meters south of the track of the Oregon Short Line Railroad, 1 meter south of the fence; on a sandstone post. (Note 11.*)

2097 H.—0.3 mile southeast of *Eaton, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at mile pole 524, west of the track. (Note 18.*)

J₆.—About 1 mile west of *Eaton, Washington County, Idaho*, on the railroad right of way, 2 poles west of mile pole 525, 15 meters south of the track, and 4 meters east of a telegraph pole.† (Note 2.*)

2087 H.—5.2 miles east of *Olds Ferry, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, 4.5 meters east of the fifth pole east of mile pole 527, 3 meters north of the track. (Note 18.*)

2086 H.—2.2 miles east of *Olds Ferry, Washington County, Idaho*, 21 meters west of the seventh pole east of mile pole 530, 3 meters north of the track, on the right of way of the Oregon Short Line Railroad. (Note 18.*)

K₆.—At *Olds Ferry, Washington County, Idaho*, on the railroad right of way, 27 meters east of the track and 1 meter from the fence, 9 poles north of mile pole 532, and 3 poles south of the station sign; on a limestone post.† (Note 11.*)

* See pp. 162-166.

† This bench mark is on the Oregon Short Line Railroad.

2070 H.—About three-fourths mile west of *Olds Ferry, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, 5.4 meters east of the track, opposite mile pole 533. (Note 18.*)

2069 H.—About 4 miles west of *Olds Ferry, Washington County, Idaho*, on the right of way of the Oregon Short Line Railroad, at the first telegraph pole west of mile pole 536, 2.4 meters from the fence north of the track. (Note 18.*)

2079 A.—2.4 miles northeast of *Huntington, Baker County, Oreg.*, on the right of way of the Oregon Short Line Railroad, in a bridge over the Snake River, 1 meter east of the west end, on a stone stringer south of the track. (Note 17.*)

O.—About 2 miles northeast of *Huntington, Baker County, Oreg.*, 12 poles south of mile pole 539, in the north abutment of bridge 380 of the Oregon Short Line Railroad over Burnt River, in the concrete offset east of the track, 0.3 meter from the east edge, and 0.2 meter from the south edge. (Note 16.*)

P.—About $1\frac{1}{2}$ miles northeast of *Huntington, Baker County, Oreg.*, 2 poles south of mile pole 540, in the north abutment of bridge 381 of the Oregon Short Line Railroad over Burnt River, in the sandstone offset east of the track, 0.2 meter from the south edge and 0.25 meter from the east edge. (Note 16.*)

Q.—About 1 mile northeast of *Huntington, Baker County, Oreg.*, east of the track, 7 poles south of mile pole 540, in the south abutment of bridge 382 of the Oregon Short Line Railroad over Burnt River, 0.3 meter from the south edge and 0.28 meter from the east edge of the sandstone offset east of the track. (Note 16.*)

2105 A.—At *Huntington, Baker County, Oreg.*, on Washington Street, in the front wall of the brick building of the Oregon Commercial Co., near the stairway between the grocery store and the drug store, in the sixth row of bricks above the stone foundation. (Note 17.*) Reported loose, 1903.

R.—At *Huntington, Baker County, Oreg.*, in the front wall of the brick building occupied by the Owl Drug Co. and the post office, midway between the show window and the stairway, west of the entrance to the store, 1.2 meters above the ground. (Note 57.*)

S.—About 1 mile north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 365 of the Oregon-Washington Railroad & Navigation Co., in the concrete offset east of the track, 0.25 meter from the south edge and 0.4 meter from the east edge. (Note 16.*)

T.—About 2 miles north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 364 of the Oregon-Washington Railroad & Navigation Co., in the concrete offset east of the track, 0.25 meter from the south edge, and 0.5 meter from the east edge. (Note 16.*)

U.—About 3 miles north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 362, in the concrete offset east of the track, 0.25 meter from the south edge and 0.5 meter from the east edge.† (Note 16.*)

V.—About $3\frac{3}{4}$ miles north of *Huntington, Baker County, Oreg.*, in the north abutment of bridge 360, in the concrete offset east of the track, 0.25 meter from the south edge and 0.5 meter from the east edge.† (Note 16.*)

2215 A.—About 5 miles northwest of *Huntington, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 108 meters south of bridge 356, 9 meters east of the track, 4 meters west of the fence. (Note 18.*)

W.—About $5\frac{1}{2}$ miles northwest of *Huntington, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., about $\frac{1}{2}$ mile north of mile pole 400, about 10 meters west of the track and 5 meters west of the whistle board on a limestone post. (Note 11.*)

X.—About $6\frac{1}{2}$ miles north of *Huntington, Baker County, Oreg.*, about $\frac{1}{2}$ mile north of mile pole 399, in the south concrete abutment of bridge 355, 2.5 meters east of the track, in an offset of the abutment, 35 centimeters from the north edge, and 35 centimeters from the east edge.† (Note 16.*)

Y.—About 8 miles north of *Huntington, Baker County, Oreg.*, 3 poles north of mile pole 397, in the north concrete abutment of bridge 353, in an offset of the abutment east of the track, 1 meter from the east edge and 0.3 meter from the south edge.† (Note 16.*)

2369 A.—About $1\frac{1}{2}$ miles south of *Weatherby, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 180 meters west of the west portal of tunnel 6, 12 meters north of the track, 2.5 meters from the east corner of the fence. (Note 18.*)

Z.—About $\frac{1}{4}$ mile north of the station sign at *Weatherby, Baker County, Oreg.*, and about 7 miles south of Durkee, on the right of way of the Oregon-Washington Railroad & Navigation Co., 1 pole north of mile pole 391, 15 meters west of the track. (Note 2.*)

A₂.—About $\frac{3}{4}$ mile north of *Weatherby, Baker County, Oreg.*, about $6\frac{1}{2}$ miles south of Durkee, in the north abutment of bridge 343, east of the track, in the concrete offset of the abutment, 45 centimeters from the south edge and 62 centimeters from the east edge.† (Note 16.*)

2518 A.—About $4\frac{3}{4}$ miles south of *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., about 300 meters north of mile pole 389, 4 meters south of the wagon road, 7 meters north of the track, and 1.2 meters south of the fence. (Note 18.*)

B₂.—About $2\frac{3}{4}$ miles southeast of *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., about 1 pole north of mile pole 387, 15 meters east of the track. (Note 2.*)

2647 A.—At *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 0.6 meter east of the depot platform, 11 meters north of the track. (Note 18.*)

C₂.—About 2 miles west of *Durkee, Baker County, Oreg.*, in the west concrete abutment of bridge 324, south of the track; in the offset of the abutment, 0.6 meter from the south edge and 0.4 meter from the west edge.† (Note 16.*)

* See pp. 162-166.

† This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

D₂.—About $3\frac{1}{4}$ miles west of *Durkee, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 9 meters west of mile pole 381, 0.6 meter from the fence, on a limestone post. (Note 11.*)

3139 A.—55 meters north of the section house at *Unity, Baker County, Oreg.*, and about 7 miles northwest of *Durkee*, east of the track, just east of a wagon road.† (Note 18.*)

E₂.—About $\frac{1}{4}$ mile north of the station sign at *Unity, Baker County, Oreg.*, and about $7\frac{1}{2}$ miles northwest of *Durkee*, in the south concrete abutment of bridge 320, 4 poles north of mile pole 377, in the offset of the abutment east of the track, 0.2 meter west of the east edge and 0.2 meter from the north edge.† (Note 16.*)

F₂.—About $3\frac{3}{4}$ miles southeast of *Pleasant Valley, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 1.5 meters south of mile pole 373. (Note 11.*)

3818 A.—At *Pleasant Valley, Baker County, Oreg.*, 30 meters south of the track, 4.5 meters south of the southwest corner of the railroad house.† (Note 18.*) (Reported in battered condition 1904).

G₂.—About $\frac{1}{2}$ mile east of *Encina, Baker County, Oreg.*, 4 poles east of mile pole 367, 12 meters south of the track of the Oregon-Washington Railroad & Navigation Co., at a road crossing 3 meters east of a telegraph pole. (Note 2.*)

H₂.—About 1 mile southeast of the siding at *Norton, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 2 poles east of mile pole 364, in a concrete culvert south of the track. (Note 16.*)

3646 A.—At *Norton, Baker County, Oreg.*, 45 meters north of the section house.† (Note 18.*)

I₂.—About 2 miles south of *Baker City, Baker County, Oreg.*, in the north concrete abutment of bridge No. 307, east of the track, in an offset of the abutment, 45 centimeters from the east edge.† (Note 16.*)

3433 A.—At *Baker City, Baker County, Oreg.*, in the astronomic pier in the front yard of the public high school. (Note 17.*)

J₂.—At *Baker City, Baker County, Oreg.*, in the north face of the brick building of the Sage & Grace Mercantile Co., 1.2 meters above the ground and 3 meters east of the northwest corner of the building. (Note 57.*)

K₂.—At *Baker City, Baker County, Oreg.*, in the east face of the limestone building of the Order of Elks known as *Elks Hall*, 0.6 meter from the northeast corner, 1.2 meters above the ground. (Note 1.*)

L₂.—At *Baker City, Baker County, Oreg.*, in the north face of the limestone city hall building, 0.6 meter from the northwest corner, 1.2 meters above the ground. (Note 1.*)

M₂.—About 3 miles north of *Baker City, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., at mile pole 354, 2 meters east of the track, on a limestone post. (Note 11.*)

3338 A.—1.5 miles north of *Wingville, Baker County, Oreg.*, about 6 miles north of *Baker City*, 180 meters east of *Jenning's house*, on the main road between *Haines* and *Baker City*, 20 meters west of the railroad track.† (Note 18.*)

N₂.—1.5 miles south of *Haines, Baker County, Oreg.*, and about 9 miles north of *Baker City*, on the right of way of the Oregon-Washington Railroad & Navigation Co., at mile pole 348, 27 meters west of the track. (Note 2.*)

O₂.—About 2 miles north of *Haines, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., $\frac{1}{4}$ mile north of mile pole 345, 15 meters east of the track at the fence corner north of the road crossing. (Note 2.*)

3372 A.—At *Hutchinson, Baker County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 8 meters north of mile pole 342 and 13 meters west of the track. (Note 18.*)

P₂.—About 2 miles southwest of *North Powder, Union County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., $2\frac{1}{2}$ poles south of mile pole 339, 15 meters east of the track at a fence corner. (Note 2.*)

3233 A.—At *North Powder, Union County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 36 meters southwest of the station, and 10 meters south of the center of the track, at the northeast corner of the fence, 4 meters south of the wagon road. (Note 18.*)

Q₂.—At *North Powder, Union County, Oreg.*, in the southeast wall of the limestone building of the I. O. O. F., 1.2 meters southwest from the east corner and 1.4 meters above the ground. (Note 57.*)

R₂.—About $2\frac{3}{4}$ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, about $\frac{1}{4}$ mile west of mile pole 334; the center of a cross in a square cut in the face of native lava rock, about 3 meters north of the center of the track, and lettered "U. S. B. M."

S₂.—About $3\frac{1}{4}$ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, in the west concrete abutment of bridge 271, north of the track. (Note 5.*)

T₂.—About $3\frac{1}{2}$ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, in the west concrete abutment of bridge 270, north of the track. (Note 5.*)

3228 A.—About $4\frac{1}{2}$ miles northeast of *North Powder, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, 54 meters north of the north portal of tunnel 5, 4.2 meters east of the track. (Note 18.*)

U₂.—About 3 miles southwest of *Telocaset, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, 27 meters north of the track, at mile pole 331. (Note 2.*)

V₂.—About $\frac{1}{4}$ mile south of *Telocaset, Union County, Oreg.*, on the Oregon-Washington Railroad & Navigation Co. right of way, 4 poles south of mile pole 328, in the northwest fence corner of a road crossing. (Note 11.*)

3440 A.—At *Telocaset, Union County, Oreg.*, on the railroad right of way, 1 meter east of the east corner of the fence at the section house and 5.4 meters north of the center of the tracks.† (Note 18.*)

W₂.—About 3 miles north of *Telocaset, Union County, Oreg.*, on the railroad right of way, east of the track and in the line of the telegraph poles, 2 meters north of mile pole 325.† (Note 2.*)

* See pp. 162-166.

† This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

3021 A.—About $4\frac{1}{4}$ miles south of *Union Station, Union County, Oreg.*, on the railroad right of way, 300 meters west of the second snowshed southeast of Union Station, 4.5 meters south of the track.† (Note 18.*)

X₂.—About $1\frac{1}{4}$ miles southeast of *Union Station, Union County, Oreg.*, on the railroad right of way, 8 poles southeast of mile pole 319, 12 meters east of the track.† (Note 2.*)

Y₂.—At *Union, Union County, Oreg.*, in the east face of the brick and stone building occupied by Joseph Wright's store, 0.5 meter from the southeast corner and 1.2 meters above the ground. (Note 57.*)

Z₂.—At *Union, Union County, Oreg.*, in the brick building occupied by the Foster Brown Co., dry goods; in the top of the stone stringer on the north side of the building, 0.6 meter from the northeast corner. (Note 1.*)

G. S. Union.—At *Union, Union County, Oreg.*, in the brick and stone building owned and occupied by the Grande Ronde Valley Lodge, No. 56, of Ancient Free and Accepted Masons; in the top of the stone stringer on the east face of the building, 1 meter from the southeast corner. (Note 17,* the elevation and datum letter are not given.)

A₃.—At *Union, Union County, Oreg.*, in the west face of the brick building of the First National Bank, 1 meter from the northwest corner and 1.2 meters above the ground. (Note 57.*)

2705 A.—About $\frac{3}{4}$ mile northwest of *Union Station, Union County, Oreg.*, on the right of way of the Oregon-Washington Railroad & Navigation Co., 16 meters northeast of milepost 317, 2 meters south of fence. Iron post marked "2705 A."

B₃.—About 3 miles northwest of *Union Station, Union County, Oreg.*, on the railroad right of way, $\frac{1}{4}$ mile southeast of mile pole 315, and 3 meters northwest of a telegraph pole, 15 meters northeast of the track.† (Note 2.*)

2696 A.—About 6 miles northwest of *Union Station, Union County, Oreg.*, on the railroad right of way, 0.3 mile northwest of mile pole 312, 15 meters south of the track.† (Note 18.*)

C₃.—About 4 miles southeast of *Lagrande, Union County, Oreg.*, on the railroad right of way, 5 meters northwest of the first pole northwest of mile pole 310 and 12 meters northeast of the track.† (Note 2.*)

D₃.—About 2 miles southeast of *Lagrande, Union County, Oreg.*, on the railroad right of way, at trestle 212, 18 meters southwest of the track.† (Note 2.*)

2773 A.—At *Lagrande, Union County, Oreg.*, on the railroad right of way, 50 meters northeast of the road crossing at First Street, 9 meters north of the northwest corner of the railroad tool house, and 1.2 meters west of a telegraph pole.† (Note 18.*)

E₃.—At *Lagrande, Union County, Oreg.*, in the north face of the brick building occupied by the grocery store of J. W. White, 0.3 meter from the northeast corner of the building and 1.2 meters above the ground. (Note 57.*)

F₃.—At *Lagrande, Union County, Oreg.*, in the front of the brick and stone building occupied by the Chicago Dry Goods Co., in the limestone pillar just south of the entrance to the stairway, 1.2 meters above the ground. (Note 1.*)

G₃.—At *Lagrande, Union County, Oreg.*, in the front of the brick and stone building occupied by the Lewis printing offices, near the southwest corner and in the top of the stone stringer below the window. (Note 1.*)

2782 A.—At *Lagrande, Union County, Oreg.*, in the north face of the brick building of the Foley Hotel in the third course of plaster facing of the wall on the Chestnut Street side. (Note 17.*)

H₃.—About $2\frac{1}{2}$ miles north of *Lagrande, Union County, Oreg.*, on the railroad right of way, in the south concrete abutment of bridge 205, in an offset west of the track 1.2 meters from the nearer rail, 0.2 meter from the inside edge of the steel stringers.† (Note 16.*)

I₃.—About 3 miles north of *Lagrande, Union County, Oreg.*, on the railroad right of way, 6 poles north of mile pole 303, 10 meters south of the track near the road crossing.† (Note 2.*)

2897 A.—At *Perry, Union County, Oreg.*, 0.6 meter east of the office of the Grande Ronde Lumber Co., 14 meters north of the center of the track.† (Note 18.*)

J₃.—About $1\frac{1}{2}$ miles south of *Hilgard, Union County, Oreg.*, on the railroad right of way, 1 pole west of mile pole 299, 12 meters north of the track and 3 meters east of the pole.† (Note 2.*)

3001 A.—At *Hilgard, Union County, Oreg.*, on the railroad right of way, 12 meters west of the first telegraph pole west of the depot, 7 meters north of the center of the track.† (Note 18.*) (Slightly loose.)

3581 A.—About $5\frac{1}{2}$ miles north of *Hilgard, Union County, Oreg.*, on the railroad right of way, 36 meters east of mile pole 292, 5 meters south of the center of the track.† (Note 18.*)

K₃.—About $2\frac{1}{2}$ miles south of *Kamela, Union County, Oreg.*, on the railroad right of way, 5 poles north of mile pole 289, 4 poles west of the signboard "Spring Spur," 15 meters east of the track.† (Note 2.*)

4199 A.—At *Kamela, Union County, Oreg.*, on the railroad right of way, 13 meters south of the telegraph office, 0.4 meter north of the railroad tank, 4 meters west of the center of the track.† (Note 18.*)

3958 A.—About $3\frac{1}{2}$ miles south of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 9 meters southwest of mile pole 284, 7 meters south of the center of the track.† (Note 18.*)

L₃.—About $1\frac{1}{2}$ miles south of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 4 meters south of mile pole 282, 12 meters east of the track on a lava stone post.† (Note 11.*)

3672 A.—At *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 50 meters north of the station and 5 meters east of the center of the track.† (Note 18.*)

3454 A.—About $2\frac{1}{2}$ miles east of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 4 meters east of mile pole 278 and 4.5 meters north of the center of the track.† (Note 18.*)

M₃.—About $3\frac{1}{2}$ miles east of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, 2 poles south of mile pole 277, and 10 meters west of the track, on a lava stone post.† (Note 11.*)

* See pp. 162-166.

† This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

N₃.—About 5 miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, in the southwest concrete abutment of bridge 145, in the top of the offset west of the track.† (Note 5.)*

O₃.—About 6 miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, in the south abutment of bridge 137, in the offset west of the track.† (Note 5.)*

P₃.—About 8 miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, in the north concrete abutment of bridge 131, in the top of the offset east of the track.† (Note 5.)*

Q₃.—About 9½ miles southeast of *Meacham, Umatilla County, Oreg.*, on the railroad right of way, ⅙ mile east of mile pole 271, 12 meters south of the track.† (Note 2.)*

2570 A.—About 4½ miles west of *North Fork, Umatilla County, Oreg.*, on the railroad right of way, 162 meters south of the south end of bridge 115, 9 meters east of the center of the track.† (Note 18.)*

R₃.—About 4½ miles west of *North Fork, Umatilla County, Oreg.*, on the railroad right of way, in the north concrete abutment of bridge 115, in the top of an offset west of the track.† (Note 5.)*

S₃.—About 3 miles south of *North Fork, Umatilla County, Oreg.*, 0.5 mile south of mile pole 266, in the south abutment of a steel bridge in the offset east of the track.† (Note 16.)*

T₃.—About 2.5 miles south of *North Fork, Umatilla County, Oreg.*, at mile pole 266, 12 meters east of the track.† (Note 11.)*

2264 A.—About ½ mile north of *North Fork, Umatilla County, Oreg.*, 45 meters east of the section house, 10 meters south of the track.† (Note 18.)*

U₃.—About 1 mile northwest of *North Fork, Umatilla County, Oreg.*, in the north abutment of bridge 106, in the top of the offset east of the track.† (Note 1.)*

V₃.—About 2½ miles northwest of *North Fork, Umatilla County, Oreg.*, 4 poles northwest of mile pole 261, iron pipe in the line of the poles northeast of the track.† (Note 2.)*

2023 A.—About 6 miles southeast of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, ½ mile east of mile pole 258, 7 meters south of the track, 10 meters east of the whistling post.† (Note 18.)*

W₃.—About 3½ miles southeast of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, 2 poles southeast of mile pole 256, 18 meters west of the track.† (Note 2.)*

X₃.—About 1½ miles southeast of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, in the east abutment of bridge 86, in the top of the offset north of the track.† (Note 1.)*

1744 A.—At *Bingham Springs (Gibbon), Umatilla County, Oreg.*, 47 meters east of the depot, 11 meters north of the track, 1.2 meters east of the first telegraph pole from the depot.† (Note 18.)*

Y₃.—About 2½ miles west of *Bingham Springs (Gibbon), Umatilla County, Oreg.*, opposite mile pole 250, 12 meters north of the track.† (Note 11.)*

1523 A.—About 4 miles east of *Cayuse, Umatilla County, Oreg.*, about ½ mile west of mile pole 247, 90 meters west of a road crossing, 4 meters north of the track, and 1.2 meters east of a telegraph pole.† (Note 18.)*

Z₃.—About 3½ miles east of *Cayuse, Oreg.*, in the top of a pillar of bridge 66, 2.4 meters from the south rail, 0.6 meter from the west edge, 0.9 meter from the south edge.† (Note 16.)*

A₄.—About ½ mile east of *Cayuse, Umatilla County, Oreg.*, one-half pole west of mile pole 243 and 6 meters north of the track.† (Note 2.)*

B₄.—About 0.3 mile west of *Cayuse, Umatilla County, Oreg.*, in the east abutment of a steel bridge, in the offset north of the track.† (Note 16.)*

1355 A.—About 5½ miles east of *Mission, Umatilla County, Oreg.*, 270 meters west of mile pole 241, 6 meters south of the track and 4 meters north of a wagon road.† (Note 18.)*

C₄.—About 3 miles east of *Mission, Umatilla County, Oreg.*, 6 poles east of mile pole 239, 5 meters south of the track. Reported disturbed, 1912.† (Note 11.)*

1205 A.—At *Mission, Umatilla County, Oreg.*, 225 meters northeast of mile pole 236, 7.5 meters north of the track, 1 meter east of the telegraph pole west of the switch for the siding.† (Note 18.)*

D₄.—At *Pendleton, Umatilla County, Oreg.*, at the entrance to the brick building of the Cruise Hotel, opposite the side entrance of the St. George Hotel, in the top of the west end of the stone step. (Note 1.)*

E₄.—At *Pendleton, Umatilla County, Oreg.*, in the stone runner of the entrance to the building of brick occupied by the Delta confectionery store, on Main Street. (Note 1.)*

F₄.—At *Pendleton, Umatilla County, Oreg.*, in the east wall of the brick building of the Umatilla Implement Co., 1.2 meters above the ground, 0.2 meter from the southeast corner. (Note 57.)*

1074 A.—At *Pendleton, Umatilla County, Oreg.*, in the second block of the plaster base of the west entrance (on south side) of the Umatilla County courthouse. (Note 17.)*

G₄.—About 1 mile east of *Pendleton, Umatilla County, Oreg.*, in the west abutment of the steel bridge over the Umatilla River, in the top of the offset, north of the track.† (Note 1.)*

H₄.—About 2.5 miles northeast of *Pendleton, Umatilla County, Oreg.*, on the right of way of the Northern Pacific Railway, 10 meters north of the track. (Note 11.)*

I₄.—About 2 miles southwest of *Fulton, Umatilla County, Oreg.*, at mile pole 35, on the right of way of the Northern Pacific Railway, 10 meters west of the track. (Note 2.)*

* See pp. 162-166.

† This bench mark is on the line of the Oregon-Washington Railroad & Navigation Co.

J₄.—About 1 mile north of *McCormack, Umatilla County, Oreg.*, at mile pole 31, on the right of way of the Northern Pacific Railway, 10 meters north of the track. (Note 2.*)

K₄.—About 1 mile north of *Warren, Umatilla County, Oreg.*, at mile pole 27, on the right of way, 10 meters west of the track.† (Note 2.*)

L₄.—About 1.2 miles north of *Helix, Umatilla County, Oreg.*, at mile pole 22, on the right of way, 12 meters west of the track.† (Note 2.*)

M₄.—Near *Smeltz* (formerly *Killian Junction*), *Umatilla County, Oreg.*, 1 pole south of mile pole 19; a square hole cut in a concrete culvert, east of the track, on the right of way.† (Note 16.*)

N₄.—Near *Smeltz* (formerly *Killian Junction*), *Umatilla County, Oreg.*, at mile pole 18, on the right of way, 15 meters west of the track.† (Note 2.*)

O₄.—About 1 mile north of *Stanton, Umatilla County, Oreg.*, at mile pole 17, in the concrete culvert west of the track.† (Note 5.*)

P₄.—About 1.2 miles south of *Ring* (formerly *Canon*), *Umatilla County, Oreg.*, 1 pole north of mile pole 12, on the right of way, 5 meters west of the track.† (Note 11.*)

R₃.—About 10 miles south of *Hunts Junction, Wallawalla County, Wash.*, 0.3 mile north of mile pole 10, on the right of way, 10 meters west of the track.† (Note 11.*)

Q₃.—About 6 miles southeast of *Hunts Junction, Wallawalla County, Wash.*, at mile pole 6, on the right of way, 15 meters west of the track.† (Note 11.*)

P₃.—Near *Hunts Junction, Wallawalla County, Wash.* (See p.188.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN SEATTLE AND HUNTS JUNCTION, WASH., 1904.

Tidal 4=City.—At *Seattle, King County, Wash.*, a square cut on the northern end of the doorsill on the west side of the Rainier Grand Building on Post Street, about 1.368 meters south of Madison Street and about 0.2 meter from the edge of the sill on Post Street. As a city bench mark, its elevation is given as 13.790 feet above city datum.

Tidal 5.—At *Seattle, King County, Wash.*, the top surface of an iron hinge on a window in the rear of the old Seattle Athletic Club Building, now the Seneca Hotel, on Post Street, 2.402 meters north of Seneca Street and 0.681 meter above the lower edge of the widow sill.

G.—At *Seattle, King County, Wash.*, in the Pioneer Park at the intersection of First Avenue, James Street, and Yesler Way, 5.350 meters from the east fence of the park, 5.430 meters from the west fence, and 4.070 meters south of the totem pole, on a granite post. (Note 11.*)

City 1.—At *Seattle, King County, Wash.*, at the entrance of the Puget Sound National Bank, corner of James Street and First Avenue; a square outlined in the granite step, 0.020 meter from the edge of the step and 0.030 meter from the granite base supporting the column at the side of the doorway, the face of which is inscribed "City Datum."

City 2.—At *Seattle, King County, Wash.*, on the foundation for the chimney of the Rainier Heat, Light & Power Co.'s generating plant, 76 meters southeast of Hill's gas works and 5 meters from the siding of the Columbia & Puget Sound Railway; a cross cut in the upper surface of the top stone on the west side of the foundation, 0.03 meter from the west edge of the stone.

City 3.—At *South Seattle, King County, Wash.*, 23 meters west of the intersection of Charlestown Street and Eighth Avenue south and about 11 meters north of C. M. Felt's fence; the top of a tack or nail driven into the root of a maple tree. As that portion of the root is dead it is not likely to last many years. (1904.)

N. P.—About $\frac{7}{8}$ kilometer south of *Argo, King County, Wash.*, 65 meters south of the south cattle guard for the first railroad crossing south of Argo, 11.55 meters from the east right of way fence, 3.055 meters from the center of the nearest Columbia & Puget Sound rail, and 1.53 meters from the center of the nearest Northern Pacific rail; a shallow circular depression in the center of a cylindrical post of concrete set flush with the surface of the gravel between the tracks and marked N P on the top.

N. P.—About 4 kilometers north of *Black River* and near the old spur known as Van Asselts in *King County, Wash.*, 14 meters south of the crossing for logging teams, 1.52 meters from the center of the nearest Northern Pacific rail, and 1.66 meters from the nearest Columbia & Puget Sound rail; a shallow circular depression in the center of a cylindrical post of concrete set flush with the surface of the gravel between the tracks and marked N P on the top.

H.—At *Black River, King County, Wash.*, opposite the Northern Pacific Railway depot, 11.55 meters east of the nearest Columbia & Puget Sound rail and 1.925 meters west of the right of way fence, on a granite post. (Note 11.*)

I.—About $\frac{1}{4}$ kilometer south of *Black River, King County, Wash.*, on the sandstone abutment for the approach to the Northern Pacific Railway bridge over Black River, on the north end of the bridge and on the west side of the track; a copper bolt (Note 56*) leaded into the concrete cap, 1.34 meters from the nearest rail, 0.42 meter from the south, and 0.190 meter from the west edge of the abutment.

J.—At *Kent, King County, Wash.*, in the southwest corner of Mr. Ed. Brotchi's yard on Railroad Avenue, 0.2 meter from the west fence and 0.2 meter from the south fence inclosing the yard, on a granite post. (Note 11.*)

K.—At *Kent, King County, Wash.*, at the southwest corner of Gowe Street and First or Front Street, as commonly known in the town, a cross cut in the head of the northeast corner bolt holding the cap of the water hydrant, 2.8 meters

* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

south of the edge of Gowe Street pavement and 3.8 meters from the corner of a store building; 0.26 meter above the ground.

L.—About 2 kilometers south of *Kent*, and 0.8 kilometer north of *Thomas, King County, Wash.*, on the concrete abutment west of the track at the north end of the Northern Pacific Railway bridge over White River; a copper bolt leaded into the upper surface of the northwest corner of the abutment, 0.1 meter from each edge and 2.22 meters from the nearest rail. (Note 56.)*

M.—At *Auburn, King County, Wash.*, 73 meters north of the small Northern Pacific Railway station, in Mr. Gilmore's yard, about 20 meters northeast of his house, 2 meters west of the fence inclosing his yard, and 14.35 meters from the nearest rail. (Note 11.)*

N.—At *Auburn, King County, Wash.*, in front of R. C. Kinleyside's hardware and furniture store; a metal disk in the cement sidewalk, 2.74 meters from its outer edge and 0.16 meter from the building. (Note 59.)*

O.—About $\frac{3}{4}$ kilometer east of *Auburn, King County, Wash.*, in the top of the concrete abutment for the approach of the Northern Pacific Railway bridge over White River; the bottom of a hole 32 millimeters square, cut 6.4 millimeters deep, 0.365 meter from the east edge, 0.18 meter from the south edge of the abutment, and 1.465 meters from the nearest rail. (Note 5.)*

P.—0.9 kilometer west of the station at *Covington, King County, Wash.*, in the west abutment of the concrete approach to the Northern Pacific Railway bridge No. 2 over Jenkins Creek, 6 rails west of the nearest switch stand; a metal disk (Note 59.)*, flush with the upper surface, 0.3 meter from the east, 0.2 meter from the south edge of the abutment, and 1.5 meters south of the nearest rail of the track.

Q.—At *Covington, King County, Wash.*, 36 meters west of the station of the Northern Pacific Railway, 9 meters south of the main-line track, and 10 meters south of milepost 224; about in the line of telegraph poles and in the Northern Pacific Railway right of way, on a granite post. (Note 11.)*

R.—1.9 kilometers west of *Ravensdale, King County, Wash.*, on the Northern Pacific Railway concrete arch culvert 1Q, 3 meters north of the track, in the upper surface at the northeast corner, 0.35 meter from the east and 0.1 meter from the north edge of the culvert. (Note 57.)*

S.—At *Ravensdale, King County, Wash.*, 60 meters west of the Northern Pacific Railway station, 20 meters south of the main track, and 0.6 meter east of the railway section house. (Note 11.)*

T.—1.7 kilometers east of *Ravensdale, King County, Wash.*, on the Northern Pacific Railway concrete arch culvert 1L over Beaver Creek, 4.3 meters south of the railway track; a copper bolt in the upper surface of the culvert, 0.157 meter from the east and 0.15 meter from the south edge. (Note 57.)*

U.—3.2 kilometers east of *Ravensdale, King County, Wash.*, on a concrete arch culvert, near mile pole 215, 2.5 meters north of the Northern Pacific Railway track; a copper bolt in the upper surface, 0.15 meter from the west and 0.15 meter from the north edge. (Note 57.)*

V.—Between *Kanashat* and *Palmer Junction, King County, Wash.*, about 50 meters east of mile pole 211, in the top of the concrete abutment for the approach at the west end of the bridge of the Northern Pacific Railway over Green River, the tenth crossing over that stream; a copper bolt, 0.17 meter from the east, 0.11 meter from the south edge, and 1.5 meters south of the nearest rail. (Note 57.)*

W.—At *Palmer Junction, King County, Wash.*, about 90 meters west of the Northern Pacific Railway station, 2 meters south of the line of telegraph poles, and 9.19 meters south of the nearest rail on the Tacoma branch of the Northern Pacific Railway, on a granite post. (Note 11.)*

X.—About 4 kilometers east of *Palmer Junction, King County, Wash.*, 6 meters east of tunnel No. 8 and 3 meters north of the Northern Pacific Railway bridge 211 over Green River; a copper bolt set in the natural rock.

1046 T.—About 2.4 kilometers west of *Eagle Gorge, King County, Wash.*, on the south end of the east concrete abutment of the Northern Pacific Railway bridge 210 over Green River; a copper bolt about 3 centimeters in diameter set vertically in the top of the abutment, 0.56 meter from the west and 0.53 meter from the south edge, 1.15 meters south of the nearest rail; the head of the bolt was marked U. S. G. S. B. M. 1046T.

Y.—About 0.8 kilometer west of *Eagle Gorge, King County, Wash.*, on the south end of the east concrete abutment of Northern Pacific Railway bridge 209 over Green River; a copper bolt, set in the top of the abutment, 0.15 meter from its west edge and 1.55 meters from the rail. (Note 57.)*

Z.—At *Canton, King County, Wash.*, 60 meters east of the station, in the Northern Pacific Railway section-house yard, 12.2 meters south of the section house, and 9.7 meters north of the nearest main-track rail, on a granite post. (Note 11.)*

1205 T.—At *Canton, King County, Wash.*, 120 meters east of the railway station, 2.48 meters east of the tool house of the Northern Pacific Railway, 5.77 meters from the nearest rail. (Note 18.)*

1335 T.—At *Maywood, King County, Wash.*, about 0.34 kilometers east of the station in the Northern Pacific Railway section-house yard, 0.58 meter east of the section house, and 16.7 meters north of the nearest rail of the main track. (Note 18.)*

1531 T.—At *Hot Springs, King County, Wash.*, about 17 meters east of the southeast corner of the depot, about $5\frac{1}{2}$ meters north of the center of the main track of the Northern Pacific Railway, and about 1 meter east of the first telegraph pole east of the depot. The bench mark was loose and leaning badly; it was straightened up and made firm with concrete, care being taken to disturb its elevation as little as possible. (Note 18.)*

A₁.—At *Hot Springs, King County, Wash.*, in the lawn of the Kloeber Hotel, about 10 meters east of the walk leading to the depot, and about 3 meters south of the south porch of the hotel on a granite post. (Note 11.*)

B₁.—About 1.85 kilometers east of *Hot Springs, King County, Wash.*, in the top of the retaining wall for the east concrete abutment of Northern Pacific Railway bridge 201, 0.3 meter from the east and 1.65 meters from the north edge, 1.3 meters north of the rail. (Note 1.*) Reported about to be destroyed by raising abutments, June 1, 1907.

1614 T.—At *Lester, King County, Wash.*, in the brick projection at the southwest corner of the Northern Pacific Railway roundhouse, about 1.5 meters above the ground. (Note 17.*) This bench mark is reported to have been removed and placed in a different position when the roundhouse was repaired.

C₁.—About 1.5 kilometers east of *Weston, King County, Wash.*, in the vertical surface of the side of a rock cut, 16 meters west of mile pole 183, 2.45 meters north of the nearest rail, and 0.7 meter above the level of the top of the rail.† (Note 1.*)

D₁.—About 2.2 kilometers west of *Borup, King County, Wash.*, on the Northern Pacific Railway right of way, about 31 meters east of the west end of the third rock cut east of mile pole 182, 1.95 meters south of the nearest rail; a copper bolt stenciled B M set vertically in the natural rock.

2776 T.—At *Stam pede, King County, Wash.*, about 23 meters southwest of the Northern Pacific Railway station, about 3 meters north of the edge of the bluff forming the north bank of Deer Creek, and about 15 meters south of the main track. (Note 18.*) This bench mark was loose and was made firm with concrete, care being taken to disturb its elevation as little as possible.

E₁.—About 370 meters east of *Stam pede, King County, Wash.*, at the south side of the west entrance to Stampede Tunnel, in the vertical surface of the rock, about 3 meters south of the nearest rail, and about 1 meter above the level of the rails at that point.† (Note 1.*)

F₁.—About 1.7 kilometers east of *Stam pede, King County, Wash.*, on the north side of the track in Stampede Tunnel, near the half-way point and at the head of the grade in the tunnel, in the vertical brick wall forming the west side of a manhole, 2.15 meters north of the nearest rail, 1.55 meters above the floor, and 0.45 meter north of the side of the tunnel.† (Note 1.*)

2782 T.—About 340 meters east of the station at *Martin, Kittitas County, Wash.*, on the bank above the track, about 12 meters east of the old station house, about 6 meters south of the main track. This bench mark was loose and was made firm with concrete, care being taken not to disturb its elevation.† (Note 18.*)

G₁.—About 4.5 kilometers west of *Easton, Kittitas County, Wash.*, at the south end of the west concrete abutment of Northern Pacific Railway bridge 161 over Cabin Creek, about 195 meters east of mile pole 168 Pasco; a copper bolt stenciled B. M. set in the upper surface, 0.35 meter from the east and 0.18 meter from the south edge, and 1.67 meters south of the nearest rail.

H₁.—At *Easton, Kittitas County, Wash.*, in front and 5.5 meters south of A. O. Johnson's house, 2.35 meters east of Johnson Bros.' store, and 2.2 meters north of the fence inclosing the yard, a granite post. (Note 11.*)

I₁.—At *Easton, Kittitas County, Wash.*, originally established in the northeast corner of the yard surrounding A. J. Adams's residence, about 14 meters north of the house, 0.74 meter from the north fence, and 0.62 meter west of the east fence inclosing the yard; about 100 meters south of the Northern Pacific Railway main track. In 1907 the stone was moved to a position 44.6 feet S. 48° 33' W. of the original position. It is now 2 feet from the right-of-way fence and 48 feet from the track of the Chicago, Milwaukee & St. Paul Railway. The cap is marked with a cross. (Note 2.*)

J₁.—About 1.8 kilometers west of *Nelson, Kittitas County, Wash.*, on the west concrete abutment of bridge 151; a copper bolt (Note 56.*) leaded firmly into the top surface, 0.35 meter from the west edge and 0.18 meter from the south edge of the abutment, 1.67 meters south of the nearest rail. The top of the bolt was hammered into a rounded form.†

2030 T.—At *Nelson, Kittitas County, Wash.*, about 70 meters south of the main track, 0.3 meter north of the fence, and 3.2 meters east of the wagon road.† (Note 18.*)

K₁.—At *Cle Elum, Kittitas County, Wash.*, at the corner of Pennsylvania Avenue and Railroad Street, 3.17 meters east of the southeast corner of D. B. Burcham's building and 17.8 meters northwest of the band stand; a cross cut in the head of the southeast bolt used in fastening the cap of a fire hydrant.

L₁.—At *Cle Elum, Kittitas County, Wash.*, at the corner of Pennsylvania Avenue and First Street; in the stone wall at the northwest corner of Mr. Heckman's store, facing Pennsylvania Avenue, 0.24 meter from the northwest corner of the building, 0.37 meter north of the south edge of the stone, and 1.2 meters above the sidewalk. (Note 1.*)

M₁.—At *Cle Elum, Kittitas County, Wash.*, in the northeast corner of Mrs. E. F. Shipman's yard, 2 meters northeast of the northeast corner of the house, 1.65 meters west of the east fence, and 2 meters south of the north fence. (Note 2.*)

1838 T.—At *Teanaway, Kittitas County, Wash.*, about 45 meters west of the station signboard and about 40 meters north of the main track.† (Note 18.*)

1784 T.—At *Bristol, Kittitas County, Wash.*, 0.6 meter southeast of the southeast corner of the station and 1.64 meters north of the nearest rail.† (Note 18.*)

N₁.—About 4.4 kilometers east of *Bristol, Kittitas County, Wash.*, about 155 meters east of mile pole 141, a copper bolt in the upper surface of a rock projecting from the side of a rock cut, 2.41 meters north of the nearest rail.† (Note 57.*)

* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

O₁.—About 5.5 kilometers west of *Thorp, Kittitas County, Wash.*, about 45 meters east of mile pole 138, on a culvert over an irrigation ditch; a copper bolt 1.5 meters west of the east edge, 0.2 meter north of the south edge of the abutment, and 1.5 meters south of the nearest rail.† (Note 57.*)

1658 T.—About 2.5 kilometers west of *Thorp, Kittitas County, Wash.*, at the first road crossing west of *Thorp*, about 42 meters north of the track.† (Note 18.*)

1634 T.—At *Thorp, Kittitas County, Wash.*, at the intersection of Main Street and Taneum Creek road. (Note 18.*)

P₁.—At *Thorp, Kittitas County, Wash.*, in the southwest corner of A. J. Schele's yard, 0.65 meter east of west fence, 0.65 meter north of south fence, and 12.67 meters southwest of the southwest corner of the house. (Note 2.*)

U. S. Base.—About 4.7 kilometers east of *Thorp, Kittitas County, Wash.*, about 18 meters east of the road crossing and about 10 meters north of the track; the bottom of a hole 2.5 centimeters square, cut about 6 millimeters deep, in the top of a stone post marked "U. S. Base."†

Q₁.—At *Ellensburg, Kittitas County, Wash.*, in the stone foundation of the Northern Pacific Railway roundhouse, on the west side of the building, about 8 meters south of the northwest door; the bottom of a hole 2.5 centimeters square, cut about 6 millimeters deep, lettered U. S. B. M.

1571 T.—At *Ellensburg, Kittitas County, Wash.*, in the stone coping forming the top of a brick pier, marked "ASTR PIER," in the State Normal School grounds. (Note 17.*)

R₁.—At *Ellensburg, Kittitas County, Wash.*, in the north stone front of the Washington State Bank, about 1.25 meters above the sidewalk. (Note 1.*)

S₁.—At *Ellensburg, Kittitas County, Wash.*, in the yard surrounding the residence of Ernest Maddux, 1.33 meters from the east fence, and 1.15 meters north of the south fence. (Note 2.*)

T₁.—At *Thrall, Kittitas County, Wash.*, opposite mile pole 122, about 20 meters south of the nearest rail, and 10 meters north of the wagon road.† (Note 2.*)

1350 T.—At *Umtanum, Kittitas County, Wash.*, about 25 meters west of the depot, and opposite the section house, about 16 meters south of the nearest rail.† (Note 18.*)

U₁.—About 0.9 kilometer east of *Umtanum, Kittitas County, Wash.*, on the east concrete abutment of the bridge over Umtanum Creek; in the upper surface, 0.25 meter north of the south edge, 0.25 meter from the west edge of the abutment, and 1.55 meters south of the nearest rail.† (Note 57.*)

V₁.—At the siding at *Canyon, Kittitas County, Wash.*, in the top of the granite foundation of the water tank, at the northeast corner; the bottom of a rectangular hole, 5 centimeters long, 2.5 centimeters wide, and 6 millimeters deep. The letters U. S. B. M. were cut near the bench mark.†

1249 T.—At *Roza, Kittitas County, Wash.*, opposite the station, about 55 meters south of the nearest rail and 0.8 meter north of the right-of-way fence.† (Note 18.*)

W₁.—At *Roza, Kittitas County, Wash.*, in the southwest corner of the section house yard, 1 meter north of the fence, 1.55 meters east of the first telegraph pole east of the depot.† (Note 2.*)

1147 T.—At *Selah, Yakima County, Wash.*, 0.85 meter west of the fence inclosing the section house yard, and 4.75 meters south of the nearest rail.† (Note 18.*)

X₁.—About 0.8 kilometer east of *Selah, Yakima County, Wash.*, in the upper surface of the center pier of masonry for the Northern Pacific Railway bridge over the Yakima River, about 2 meters below the level of the rail and about 1 meter outside the line of the north rail. (Note 6.*)

Y₁.—75 meters west of the station at *Wenas, Yakima County, Wash.*, opposite mile pole 94 and about 10 meters north of the nearest rail.† (Note 2.*)

1067 T.—At *North Yakima, Yakima County, Wash.*, in the pilaster of the northwest corner of the entrance to the city hall building, on Front Street, about 0.5 meter above the level of the sidewalk. (Note 17.*)

Z₁.—At *North Yakima, Yakima County, Wash.*, in the west end of the east Northern Pacific Railway park, about 6.1 meters east of the west fence inclosing the park. (Note 2.*)

A₂.—At *North Yakima, Yakima County, Wash.*, in the vertical stone wall at the northeast corner of Sloan's drug store; 0.32 meter east of the door, 0.33 meter from the edge of the wall, and about 1.2 meters above the sidewalk. (Note 1.*)

B₂.—At *North Yakima, Yakima County, Wash.*, in the upper surface of the stone doorsill of the stairway entrance on the east side of the First National Bank Building, 0.18 meter from the outer edge of the doorsill. (Note 57.*)

C₂.—At *North Yakima, Yakima County, Wash.*, in the surface of the cement walk leading from the residence of Mrs. Moore, 222 North Second Street, to the sidewalk, about 2.7 meters west of the sidewalk and 0.61 meter south of the north edge of the cement walk. (Note 1.*)

D₂.—About 1½ miles east of *Yakima City, Yakima County, Wash.*, on the east concrete abutment of the Northern Pacific Railway bridge over Atanum Creek; the bottom of a hole 2½ centimeters square and 6 millimeters deep, lettered "U. S. B. M.", 0.25 meter east of the west edge, 0.3 meter north of the south end of the abutment, and about 1.3 meters south of the nearest rail.

855 T.—At *Wapato, Yakima County, Wash.*, about 40 meters east of the depot and 11 meters south of the nearest rail on the main track.† (Note 18.*)

E₂.—At *Wapato, Yakima County, Wash.*, in Alexander E. McCredy's yard, 9.05 meters west of the house, 8.60 meters south of the front fence, and about 19 meters east of his store. (Note 2.*)

* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

F₂.—About 4.5 kilometers east of *Wapato, Yakima County, Wash.*, in the upper surface of the south end of the east concrete abutment for the Northern Pacific Railway bridge 77, over an irrigation ditch, 0.2 meter from the west and south edges of the abutment, and 1.5 meters south of the nearest rail. (Note 1.)*

775 T.—At *Toppenish, Yakima County, Wash.*, 32.9 meters east of the Northern Pacific Railway depot, 6.85 meters south of the nearest rail of the main track, and very near the northeast corner of the little park east of the depot. (Note 18.)*

G₂.—At *Toppenish, Yakima County, Wash.*, 21.07 meters west of the northwest corner of the section house, about 1 meter inside the fence inclosing the yard, and 11.34 meters south of the nearest rail of the main track.† (Note 2.)*

H₂.—At *Toppenish, Yakima County, Wash.*, in the upper surface of the concrete foundation supporting the pillars for the Northern Pacific Railway water tank, under the northern one of the two western pillars, 0.26 meter north of the south edge, and 0.25 meter from the east (?) edge, 7 meters north of the nearest rail of the main track. (Note 57,* not leaded.)

717 T.—At the first wagon road crossing over the railroad west of the siding at *Alfalfa, Yakima County, Wash.*, about 0.8 kilometer west of mile pole 66, 0.9 meter east of the fence for the road crossing and 13 meters south of the nearest rail.† (Note 18.)*

I₂.—At *Alfalfa, Yakima County, Wash.*, 6.20 meters west of mile pole 66, and 1.75 meters east of a telegraph pole, in line with the telegraph poles, and 14.67 meters south of the nearest rail of the main track.† (Note 2.)*

674 T.—At *Satus, Yakima County, Wash.*, 14 meters west of the northwest corner of the depot and 9.85 meters south of the nearest rail of the main track.† (Note 18.)*

J₂.—About 0.9 kilometer east of *Satus, Yakima County, Wash.*, 1.78 meters west of the second telegraph pole east of mile pole 60, 10.89 meters south of the nearest rail and in line with the telegraph poles.† (Note 2.)*

717 T.—Near *Mabton, Yakima County, Wash.*, nearly opposite milepost 56, 36 meters south of the nearest rail and 2.8 meters north of the railway fence.† (Note 18.)*

715 T.—At *Mabton, Yakima County, Wash.*, 16.50 meters east of the southeast corner of the Northern Pacific section house and just outside section house yard fence, 9.75 meters north of the nearest rail of the main track. (Note 18.)*

K₂.—About 0.5 kilometer east of *Mabton, Yakima County, Wash.*, 4.35 meters west of the first telegraph pole east of milepost 52, and in line with the telegraph poles, 15.45 meters south of the nearest rail of the main track.† (Note 2.)*

696 T.—At *Byron, Yakima County, Wash.*, 126 meters east of milepost 46, 38 meters south of the nearest rail of the main track, 4 meters south of the center of the Prosser-Mabton wagon road, near the corner of an orchard fence.† (Note 18.)*

L₂.—About 1.3 kilometers east of the siding at *Byron, Yakima County, Wash.*, 2.5 meters west of the third telegraph pole west of mile pole 45, in line with the telegraph poles, and 10 meters south of the nearest rail.† (Note 2.)*

M₂.—At *Prosser, Benton County, Wash.*, in the upper surface of the concrete foundation supporting the pillars of the Northern Pacific water tank, at the southeast side of the southern one of the two eastern pillars, 0.45 meter east of the west edge of the foundation and 0.07 meter west of the east edge, 7.55 meters south of the nearest rail of the main track. (Note 57,* not leaded.)

661 T.—At *Prosser, Benton County, Wash.*, 53.5 meters west of the northwest corner of the Northern Pacific depot, in the corner of an orchard, 12 meters north of the nearest rail of the main track and 0.8 meter east of the sidewalk. (Note 18.)*

N₂.—At *Prosser, Benton County, Wash.*, in the vertical surface of the east end of the south brick wall of the Nelson Rich block on Sixth Street, 1.51 meters above the foundation of the building and 0.21 meter from either edge of the south wall. (Note 1.)*

O₂.—At *Prosser, Benton County, Wash.*, in front of the show window of the Carl A. Jensen block on Bennett Avenue, in the top of the concrete coping, 1 meter west of the east edge and 2.95 meters east of the entrance to the drug store in the block. (Note 1.)*

P₂.—About 0.9 kilometer east of *Prosser, Benton County, Wash.*, 116 meters east of mile pole 40, opposite the third telegraph pole east of the mile pole, and 5.4 meters north of the nearest rail.† (Note 2.)*

627 T.—At *Gibbon, Benton County, Wash.*, about 0.7 kilometer east of milepost 35 and about 45 meters north of the nearest rail of the main track.† (Note 18.)*

534 T.—At *Chandler (siding), Benton County, Wash.*, 45 meters east of mile pole 30, about 4.7 meters north of the center of the main track and about 0.5 meter west of the southwest corner of the fence surrounding the yard of the Northern Pacific section house. (Note 18.)*

Q₂.—About 2.7 kilometers west of *Kiona, Benton County, Wash.*, 0.4 kilometer east of milepost 26, in a ledge of natural rock, 3.03 meters south of the nearest rail and on a level with the track.† (Note 57,* not leaded.)

515 T.—At *Kiona, Benton County, Wash.*, in the northeast corner of the railroad park west of the depot, 8.3 meters west of the northwest corner of the station and 3.47 meters south of the nearest rail of the main track.† (Note 18.)*

R₂.—At *Kiona, Benton County, Wash.*, in the southeast corner of the railroad park north of the track, 7.48 meters north of the nearest rail of the main track, 13.40 meters north of the northeast corner of the station and 1.40 meters northwest of the corner post of the park fence, on a granite post.† (Note 11.)*

S₂.—1.6 kilometers east of *Kiona, Benton County, Wash.*, 1.52 meters east of the second telegraph pole west of mile pole 23 and 15.5 meters south of the track, in line with the telegraph poles.† (Note 18.)*

* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

640 T.—Nearly 3 kilometers west of *Badger, Benton County, Wash.*, about 10 meters north of mile pole 19 and about 13 meters north of the track.† (Note 18.*)

T₂.—At *Badger, Benton County, Wash.*, 21 meters north of mile pole 17, 27.8 meters north of the nearest rail of the main track near the line of the Northern Pacific right of way, on a granite post. (Note 11.*)

605. T.—About 4.7 kilometers east of *Badger, Benton County, Wash.*, 0.95 meter east of the first telegraph pole east of mile pole 14, and 15.25 meters south of the nearest rail, in line with the telegraph poles.† (Note 18.*)

567 T.—At *Relief (siding), Benton County, Wash.*, 0.75 meter east of the seventh telegraph pole west of mile pole 8, and 15.50 meters south of the nearest rail of the main track, in line with the telegraph poles.† (Note 18.*)

U₂.—Near *Relief, Benton County, Wash.*, 3.9 meters east of the first telegraph pole west of mile pole 8, 15.50 meters south of the track, in line with the telegraph poles, a granite post.† (Note 11.*)

V₂.—At *Kennewick, Benton County, Wash.*, near the building of the Northern Pacific Irrigation Co., on Front Street; about 38 meters west of Yakima Street, 0.5 meter from the north and west walls of an alcove in the northwest corner. (Note 2.*)

362 T.—At *Kennewick, Benton County, Wash.*, about 30 meters southeast from the southeast corner of the old station now used for a freight depot, about 10 meters southeast of the nearest rail of the main track, and about 3 meters northwest of the northwest corner of the section house.† (Note 18.*)

W₂.—At *Kennewick, Benton County, Wash.*, in the yard surrounding the residence of L. E. Moore, 5.1 meters southwest of the southwest corner of the house, 5 meters east of the fence inclosing the yard in front of the house, and 70 meters north of the main track of the Northern Pacific Railway, on a granite post. (Note 11.*)

X₂.—About 2 kilometers east of *Kennewick, Benton County, Wash.*, at the west end of the Northern Pacific Railway bridge over Columbia River, on the south side of the track, in the top of the concrete cap for the concrete pier, about 0.15 meter from the east and west edges, and 2.20 meters below the level of the track. (Note 1.*)

Y₂.—About 2 kilometers west of the depot at *Pasco, Franklin County, Wash.*, at the east end of the Northern Pacific Railway bridge over Columbia River, on the south side of the track, in the top of the concrete cap for the concrete pier, about 0.15 meter from the east and west edges and about 2.20 meters below the level of the track. (Note 1.*)

Z₂.—About 1 kilometer west of *Pasco, Franklin County, Wash.*, 83 meters southwest of the first switch stand, in line with the telegraph poles, and 12.2 meters southeast of the nearest rail.† (Note 2.*)

378 T.—At *Pasco, Franklin County, Wash.*, at the northwest corner of the brick roundhouse of the Northern Pacific Railway Co., in the center of the third course of bricks above the stone foundation. (Note 17.*)

A₃.—At *Pasco, Franklin County, Wash.*, in the yard surrounding the Hotel Pasco, on Court Street, 0.70 meter west of the sidewalk in front of the hotel, 10.35 meters east of the east side of the hotel, and 57.50 meters south of the main track on a granite post.† (Note 11.*)

B₃.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, on top of the granite retaining wall for the west abutment, 0.3 meter west of the east edge of the granite capstone, and 2.3 meters south of the nearest rail. (Note 1.*)

C₃.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the first pier from the west end, 1.25 meters south of the nearest rail. The bench mark is the intersection of cross lines cut with a chisel in the horizontal surface of a girder at the east end of a truss; marked "U. S. B. M." in the angles.

D₃.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, on the girder at the west end of the truss at the third pier from the west end, 1.25 meters south of the nearest rail. Marked like C₃ above.

E₃.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the fourth pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C₃ above.

F₂.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the fifth pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C₃ above.

G₃.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the sixth pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C₃ above.

H₃.—Near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, at the seventh pier from the west end of the bridge, 1.25 meters south of the nearest rail. Marked like C₃ above.

I₃.—In *Walla Walla County, Wash.*, near *Pasco, Franklin County, Wash.*, on the Northern Pacific Railway bridge over Snake River, on the top of the granite retaining wall for the east abutment, 0.3 meter east of the west edge of the granite capstone, and 1.2 meters south of the nearest rail. (Note 1.*)

J₃.—About 6.4 kilometers northwest of *Hunts Junction, Walla Walla County, Wash.*, opposite and about 25 meters northwest of mile pole 5, and 2.4 meters southeast of the first telegraph pole northwest of milepost 5, 11.2 meters northeast of the nearest rail, in the line of the telegraph poles.† (Note 2.*)

341 A.—About 7 kilometers northwest of *Hunts Junction, Walla Walla County, Wash.*, 2 meters northwest of the first telegraph pole southeast of mile pole W6, 11.2 meters northeast of the nearest rail.† (Note 18.*)

K₃.—About 3.2 kilometers northwest of *Hunts Junction, Walla Walla County, Wash.*, 1.6 meters northwest of the first telegraph pole southeast of mile pole 3, 11.2 meters northeast of the nearest rail, in line with the telegraph poles.† (Note 2.*)

L₃.—At *Hunts Junction, Walla Walla County, Wash.*, in the northeast corner of the Northern Pacific Railway section-house yard, 3 meters west of the nearest rail on the main track, 0.8 meter south of the north fence, and 0.8 meter west of the east fence inclosing the yard, on a lava post. (Note 11.*)

* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

M₃.—At *Hunts Junction, Walla Walla County, Wash.*, in the southeast corner of the yard surrounding the residence of the storekeeper for the Northern Pacific Railway, 18 meters west of the nearest rail of the main track and 0.7 meter from the south and east fences inclosing the yard. (Note 2.*)

N₃.—Near *Hunts Junction, Walla Walla County, Wash.*, at the west end of the Northern Pacific Railway bridge over Wallawalla River, in the top of the concrete abutment, 1.4 meters from the east and south edges and 1.8 meters south of the nearest rail. (Note 1.*)

O₃.—Near *Hunts Junction, Walla Walla County, Wash.*, at the east end of the Northern Pacific Railway bridge over Wallawalla River, in the top of the abutment, 0.8 meter west of the east edge, 0.5 meter north of the south edge, and 1.8 meters south of the nearest rail. (Note 1.*)

P₃.—About 8.4 kilometers southwest of *Hunts Junction, Walla Walla County, Wash.*, about 2 meters south of the seventh telegraph pole southwest of mile pole 5 and 12 meters south of the nearest rail.† (Note 2.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN SAN DIEGO AND BARSTOW, CAL., 1906.

Tidal 7.—At *San Diego, San Diego County, Cal.* The bench mark is directly under Tidal 6, described below, in the surface of a cement collar or encasement, built around the pile as a protection against destructive sea life. It is marked by a hole $\frac{3}{4}$ inch in diameter and 2 inches deep, filled with babbitt metal, toward the northwest corner of the cement encasement. A rod held upon this point clears the north side of the pier.

Tidal 6.—At *San Diego, San Diego County, Cal.*, at the United States quarantine wharf, on the north side of the long pier, at a point 12 feet east of the north and south line passing along the west side of the barracks. The mark is the head of a large iron bolt countersunk into the upper surface of the wooden sill into which copper tacks were driven flush with the surface, forming a cross and the letters "U. S. B. M."

Tidal 3.—At *San Diego, San Diego County, Cal.*, in the United States quarantine grounds, near the inner end of the pier and southwest of the blacksmith shop. The mark is the center of the top of a cement monument, 1 foot square and 2 feet long, projecting 1 foot above the ground, resting upon a pier built of rocks and cement upon the sand, 3 feet deep, $2\frac{1}{2}$ by 4 feet at the bottom, and 2 by $1\frac{1}{2}$ feet at the top. The monument was marked on the top by the letters "U. S. C. S. 1906," and two diagonal lines, with a light dot at the center.

Tidal 2.—At *San Diego, San Diego County, Cal.*, near the northeast corner of the residence of the United States quarantine surgeon, on the cover of a sewer, a granite slab 4 feet square, resting on a brick foundation and having an iron-covered manhole, 2 feet in diameter, in its center. The mark is a drill hole filled with lead $3\frac{1}{2}$ inches from the edge of the iron cover, and northwest of the center of the hole.

Tidal 5.—At *San Diego, San Diego County, Cal.*, in the United States quarantine grounds, near the southeast corner of the cottage hospital, on the cover of a sewer, a granite slab 4 by 4 feet, cemented upon masonry and having an iron manhole 2 feet in diameter in its center. The mark is a hole $\frac{3}{4}$ inch in diameter and 2 inches deep, filled with babbitt metal flush with the surface, $6\frac{1}{2}$ inches from the manhole, on the southeast corner.

Tidal 4.—At *San Diego, San Diego County, Cal.*, outside the United States quarantine grounds, near the northwest corner about 110 feet north of the fence. It is marked by a cement pier or monument similar to Tidal 3 (p.—). The soil at the depth of 3 feet and for about a foot above is almost a hardpan—a packed gravelly clay which can scarcely be penetrated without a pick.

Tidal 1.—At *San Diego, San Diego County, Cal.*, about 400 feet almost due north of the northwest corner of the United States quarantine grounds. The mark is the center of the top of a granite block 10 inches square which is tilted slightly so that the east side of the top is $\frac{3}{4}$ inch lower than the west side, and the south side is $\frac{1}{2}$ inch lower than the north side.

35 Sea.—At *Roseville, Point Loma, San Diego County, Cal.*, an iron pipe, marked "35 Sea," in the northeast corner of the public-school grounds. (Note 18.*)

A.—About $1\frac{1}{4}$ miles north of *Roseville, Point Loma, San Diego County, Cal.*, at the inside corner of the public road leading from Roseville to Old Town, in range with the telephone poles, and 1 meter south of the pole set in the corner. The mark is set in hardpan. (Note 2.*)

B.—About $1\frac{2}{3}$ miles north of *San Diego, San Diego County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, about 50 meters north of mile pole 266, in the center of the horizontal surface at the west end of concrete culvert "C 266," and $2\frac{1}{2}$ meters below the rail. (Note 1.*)

C.—At *San Diego, San Diego County, Cal.*, at the southwest corner of Fir and California Streets, on the Atchison, Topeka & Santa Fe Railway right of way, 3 meters west of the track, and on the west side of the iron rim to a manhole. (Note 13.*)

42 S. D.—At *San Diego, San Diego County, Cal.*, in the foundation pile 4 feet above the ground just north of the southeast corner of the east wing of the courthouse. (Note 17.*)

City.—At *San Diego, San Diego County, Cal.*, at the southwest corner of Third and D Streets; the north corner of the granite base of the west column at the main entrance to the San Diego Union Building (old City Hall). It corresponds to 40.00 feet of the city datum.

D.—At *Old Town, San Diego County, Cal.*, about 100 meters east of the Atchison, Topeka & Santa Fe Railway, in the southwest corner of the public-school grounds. The mark is set in hardpan. (Note 11.*)

* See pp. 162-166.

† This bench mark is on the Northern Pacific Railway.

25 S. D.—At *American Park, San Diego County, Cal.*, about 215 meters north of the railway station, at the southwest angle of the junction of the road to Pacific Beach. (Note 18.*)

E.—About 1 mile north of *Atwood, San Diego County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way; in the center of the horizontal surface at the west end of concrete culvert F260. (Note 4.*)

F.—About $1\frac{1}{4}$ miles northwest of *Ladrillo, San Diego County, Cal.*, and 25 meters northwest of mile pole 258 and $\frac{1}{3}$ meter east of the Atchison, Topeka & Santa Fe Railway right of way. The mark is set in clay in a fence corner. (Note 2.*)

G.—About 80 meters west of the signboard at *Selwyn, San Diego County, Cal.*, and 16 meters north of the Atchison, Topeka & Santa Fe track. (Note 11.*)

376 S. D.—At *Linda Vista, San Diego County, Cal.*, 8 meters west of the section house, 3 meters east of the siding, in the northwest corner of the yard. (Note 18.*)

31 S. D.—At *Sorrento, San Diego County, Cal.*, 11 meters north of the station; 5 meters northwest of the section house, 8 meters east of a road crossing. (Note 18.*)

H.—At *Sorrento, San Diego County, Cal.*, about 75 meters southwest of the Atchison, Topeka & Santa Fe Railway station; in the corner of the fence, on land owned by John Works. (Note 11.*)

I.—About 1 mile south of *Del Mar, San Diego County, Cal.*, 1 meter south of the second telegraph pole south of the road crossing, 15 meters east of the Atchison, Topeka & Santa Fe track and 3 meters above the rail. The mark is set in sand. (Note 2.*)

J.—At *Del Mar, San Diego County, Cal.*, in the center of the east face of an old cement foundation on west Tenth Street, about 100 meters west of the Atchison, Topeka & Santa Fe Railway, and on land owned by J. W. Bennett. (Note 4.*)

K.—About $1\frac{1}{4}$ miles southeast of *Encinitas, San Diego County, Cal.*, in the center of the horizontal surface of the coping at the southwest end of concrete culvert A240 of the Atchison, Topeka & Santa Fe Railway. (Note 4.*)

L.—At *Enrinitas, San Diego County, Cal.*, about $\frac{1}{4}$ mile west of the Atchison, Topeka & Santa Fe Railway station, in the middle of the front yard of the public-school grounds at the corner of Third and E Streets. The mark is set in cement about 35 meters east of the schoolhouse. (Note 2.*)

M.—About $\frac{2}{3}$ of a mile southeast of *Carlsbad, San Diego County, Cal.*, on a public highway, near the intersection of the Atchison, Topeka & Santa Fe Railway right-of-way fence and the cattle guard at the eastern corner of the crossing. (Note 11.*)

N.—At *Carlsbad, San Diego County, Cal.*, about 175 meters southwest of the Atchison, Topeka & Santa Fe Railway station, at the south end of the first concrete basement step at the east corner of the most northerly house in the park owned by the Huntington Syndicate Co. (Note 4.*)

O.—At *Oceanside, San Diego County, Cal.*, on railroad property, about 60 meters south of the Atchison, Topeka & Santa Fe station, about 10 meters southwest of the track, and $\frac{1}{3}$ meter outside of the fence. (Note 11.*) Probably destroyed in 1913.

P.—At *Oceanside, San Diego County, Cal.*, on the south corner of First and Ditmar Streets; in the northeast side of the First Methodist Episcopal Church; $\frac{2}{3}$ meter from the north corner, and 1 meter above the ground. (Note 4.*)

Q.—At *Oceanside, San Diego County, Cal.*, at the west corner of Second and Hill Streets, on the step of the side entrance to the Oceanside Bank building. (Note 13.*)

R.—At *Oceanside, San Diego County, Cal.*, on the northwest side of Third Street, between Tremont and Hill Streets, in the northeast side of the brick store owned by P. J. Brannen; 1 meter from the east corner and 1 meter above the ground. (Note 1.*)

S.—About $\frac{2}{3}$ of a mile southeast of *Las Flores, San Diego County, Cal.*, $9\frac{1}{2}$ telegraph poles southeast of mile pole 219, and 12 meters southwest of the Atchison, Topeka & Santa Fe Railway track. The mark is set in clay. (Note 2.*)

T.—About $\frac{1}{3}$ mile southeast of *Las Flores, San Diego County, Cal.*, $\frac{1}{3}$ meter from the northwest corner of the horizontal surface of the coping at the southwest end of concrete culvert A220 of the Atchison, Topeka & Santa Fe Railway. The mark is 3 meters below the rail. (Note 4.*)

84 S. B.—At *Las Flores, San Diego County, Cal.*, 3 meters southwest of the water tank on the east side of the track. (Note 18.*)

U.—About 45 meters west of the signboard at *Don (formerly Jerome), San Diego County, Cal.*, between the Atchison, Topeka & Santa Fe Railway right-of-way fence and the first telephone pole northwest of the warehouse. (Note 11.*)

165 S. B.—About 2.4 miles northwest of *Don (formerly Jerome), San Diego County, Cal.*, 16 meters east of the Atchison, Topeka & Santa Fe track, in a fence corner on the south side of the cattle crossing. (Note 18.*)

28 S. B.—At *San Onofre, San Diego County, Cal.*, in the yard, 6 meters in front of the section bunk house. (Note 18.*)

V.—About $\frac{2}{5}$ mile west of *San Onofre, San Diego County, Cal.*, about 150 meters west of the crossing of the county road and the Atchison, Topeka & Santa Fe Railway, on the north side of the road and $\frac{1}{3}$ meter south of the railroad right of way. (Note 11.*)

W.—About $\frac{1}{2}$ mile northwest of *Mateo, Orange County, Cal.*, about 75 meters east of the Atchison, Topeka & Santa Fe Railway, 3 meters north of the county road, and 4 meters west of the bridge, near the corner of the fence. (Note 2.*)

X.—About $\frac{2}{3}$ mile north of *Serra, Orange County, Cal.*, opposite the second telegraph pole southwest of mile pole 199; $\frac{1}{2}$ meter southeast of the Atchison, Topeka & Santa Fe Railway right of way; in the corner of a fence, at the foot of a hill. (Note 2.*)

103 S. B.—At *San Juan Capistrano* (railroad station, *Capistrano*), *Orange County, Cal.*, in the northwest corner of the lower plot south of the Atchison, Topeka & Santa Fe station and east of the track. (Note 18.*)

Y.—At *San Juan Capistrano* (railroad station, *Capistrano*), *Orange County, Cal.*, northeast of the Capistrano Mission; in the southwest corner of the public-school grounds. (Note 11.*)

Z.—At *San Juan Capistrano* (railroad station, *Capistrano*), *Orange County, Cal.*, $\frac{1}{4}$ mile north of the Atchison, Topeka & Santa Fe Railway station, and about 100 meters north of mile pole 197, at the east end of a large concrete culvert, $\frac{1}{2}$ meter from the north end of the horizontal surface of the coping. (Note 1.*)

A₁.—About $4\frac{1}{2}$ miles south of *El Toro*, *Orange County, Cal.*, in the center of the horizontal surface of the coping at the west end of concrete culvert A193 of the Atchison, Topeka & Santa Fe Railway. (Note 14.)

278 S. B.—About $4\frac{1}{2}$ miles south of *El Toro*, *Orange County, Cal.*, about 13 meters east of the Atchison, Topeka & Santa Fe track, in a fence corner at a road crossing. (Note 18.*)

444 S. B.—At *El Toro*, *Orange County, Cal.*, about 2 feet from the front of the schoolhouse in the angle formed by the porch and the building. (Note 18.*)

B₁.—About $1\frac{1}{2}$ miles southeast of *Irvine*, *Orange County, Cal.*, opposite half-mile pole 194 $\frac{1}{2}$; at the corner of the public road, $\frac{1}{2}$ meter north of the Atchison, Topeka & Santa Fe Railway right of way. (Note 11.*)

C₁.—At *Irvine*, *Orange County, Cal.*, 40 meters south of the Atchison, Topeka & Santa Fe Railway station; in the north corner of the public-school grounds. (Note 11.*)

D₁.—About $\frac{1}{2}$ mile southeast of *Aliso*, *Orange County, Cal.*, on the public highway, at the southwest corner of the road crossing, near mile pole 178. (Note 2.*)

E₁.—At *Santa Ana*, *Orange County, Cal.*, about $1\frac{1}{2}$ miles southeast of the Atchison, Topeka & Santa Fe Railway station and $3\frac{1}{2}$ telegraph poles west of mile pole 177, in the horizontal surface of the irrigation culvert, on the south side of the track, at the road crossing. (Note 4.*)

F₁.—At *Santa Ana*, *Orange County, Cal.*, the largest point of the star on the top of the hydrant on the north side of Chestnut Street, between the Southern Pacific Railway and the Atchison, Topeka & Santa Fe Railway.

City.—At *Santa Ana*, *Orange County, Cal.*, a copper wire set in the center of a cement block, on the northeast corner of Third and Garfield Streets.

G₁.—At *Santa Ana*, *Orange County, Cal.*, in the water table facing Third Street at the northwest corner of the city hall, and $1\frac{1}{4}$ meters above the walk. (Note 1.*)

H₁.—At *Santa Ana*, *Orange County, Cal.*, on the southeast corner of the east granite balustrade, at the main entrance to the courthouse, 1 meter above the walk. (Note 13.*)

I₁.—At *Orange*, *Orange County, Cal.*, in the center of the west side of the plaza, 5 meters east of the west fence. (Note 2.*)

J₁.—At *Orange*, *Orange County, Cal.*, in the vertical surface of the concrete water table at the north side of the main entrance to the Union High School building, and $\frac{1}{2}$ meter above the balustrade. (Note 1.*)

K₁.—About $1\frac{1}{4}$ miles north of *Orange*, *Orange County, Cal.*, about 45 meters north of mile pole 46, and just southeast of a road crossing, on land owned by N. T. Edwards. (Note 11.*)

L₁.—At *Olive*, *Orange County, Cal.*, about 225 meters northeast of the Atchison, Topeka & Santa Fe Railway station in the public-school grounds on the west side of the front entrance to the schoolhouse and near the main building. The mark is set in gravel. (Note 2.*)

M₁.—About $\frac{7}{8}$ mile north of *Olive*, *Orange County, Cal.*, at the northeast corner of the steel base of the plate girder bridge A44 of the Atchison, Topeka & Santa Fe Railway, and about $\frac{2}{3}$ meter below the rail. (Note 13.*)

N₁.—At *Richfield*, *Orange County, Cal.*, about 40 meters north of the railroad station, at the northwest corner of the highway crossing, and in range with the telephone poles. (Note 11.*)

R. R.—About 1 mile east of *Yorba*, *Orange County, Cal.*, near the junction of two public roads. The mark is a wire nail inclosed in an outlined square in the center of the horizontal surface at the north end of concrete culvert D40 of the Atchison, Topeka & Santa Fe Railway.

O₁.— $1\frac{1}{2}$ telegraph poles southwest of the signboard at *Horse Shoe Bend*, *Orange County, Cal.*, on the sloping surface of the concrete canal, at the road crossing, and 8 meters south of the small highway bridge. (Note 1.*)

P₁.—About $1\frac{1}{2}$ miles west of *Gypsum*, *Orange County, Cal.*, $\frac{1}{2}$ meter from the east end of the horizontal surface of the coping at the north end of concrete culvert C35 of the Atchison, Topeka & Santa Fe Railway. The mark is lettered "U. S." (Note 4.*)

Q₁.—About 1 mile southwest of *Crary*, *Riverside County, Cal.*, 23 meters south of mile pole 29, and 14 meters west of the Atchison, Topeka & Santa Fe track, on the north slope of a small knoll. (Note 2.*)

494 S. B.—At *Crary* (*Rincon*), *Riverside County, Cal.*, on north side of street at southeast corner of post office and store. (Note 18.*)

R₁.—About $\frac{2}{3}$ mile northeast of *Crary* (*Rincon*), *Riverside County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way; at the northwest corner of the road crossing. (Note 11.*)

S₁.—At *Corona*, *Riverside County, Cal.*, directly south of the Atchison, Topeka & Santa Fe Railway station, in the center of the triangular park belonging to the railroad company. (Note 2.*)

T₁.—At *Corona*, *Riverside County, Cal.*, on the west side of Main Street; in the northeast corner of the Masonic Block, $\frac{1}{2}$ meter from the east face, and $1\frac{1}{2}$ meters above the walk. (Note 4.*)

City.—At *Corona, Riverside County, Cal.*, at the northwest corner of Main and Sixth Streets, 2 meters southeast of the main entrance to the Citizens' Bank. The mark is a metal plug set in the cement walk, and corresponds to 171.20 feet, city datum.

U₁.—Within the city limits of *Riverside, Riverside County, Cal.*, 1 telegraph pole southwest of signboard "ALVORD," near the eastern corner of a road crossing, and on land owned by J. T. Hamner. (Note 2.*)

687 May.—Within the city limits of *Riverside, Riverside County, Cal.*, $\frac{1}{4}$ mile southwest of signboard "MAY," in the boulevard, about 75 meters northeast of the Magnolia Avenue crossing. (Note 18.*)

V₁.—Within the city limits of *Riverside, Riverside County, Cal.*, about $2\frac{3}{4}$ miles southwest of Arlington; at the southernmost corner of the road crossing, near mile pole 19, and 1 meter northwest of a telephone pole. (Note 11.*)

814 Arlington.—Within the city limits of *Riverside, Riverside County, Cal.*, in the center of the park at the Southern California Railway depot at Arlington. (Note 18.*)

W₁.—Within the city limits of *Riverside, Riverside County, Cal.*, $\frac{1}{2}$ mile northeast of Arlington, and 4 telegraph poles northeast of mile pole 16; at the northwest corner of a road crossing, and on land owned by R. L. Carpenter. (Note 11.*)

X₁.—Within the city limits of *Riverside, Riverside County, Cal.*, about 1 mile southwest of Casa Blanca, on the horizontal surface, at the angle, of the northwest side of the northeast abutment of trestle D15 of the Atchison, Topeka & Santa Fe Railway. (Note 13.*)

861 Casa Blanca.—Within the city limits of *Riverside, Riverside County, Cal.*, in the southeast concrete foundation pier of the depot platform at Casa Blanca. The mark is a copper bolt, stamped "861," 1 foot underground, and protected by a covered concrete cylinder 4 inches high.

863 Olivewood.—About $1\frac{1}{2}$ miles south of the Atchison, Topeka & Santa Fe station at *Riverside, Riverside County, Cal.*, and 4 telegraph poles south of mile pole 12, at the northwest corner of the road crossing and about two meters east of the canal. The mark is an iron post marked "863." (Note 18.*)

Y₁.—At *Riverside, Riverside County, Cal.*, 2 meters west of the northeast corner of the county courthouse, in the center of the small projection, and $\frac{1}{2}$ meter above the ground. (Note 4.*)

851 Riverside.—At *Riverside, Riverside County, Cal.*, in an alcove on the right of the main entrance to the Loring Opera House, and 4 feet above the sidewalk. (Note 17.*)

Z₁.—At *Riverside, Riverside County, Cal.*, on the horizontal surface of the cement balustrade, at the east side of the main entrance to the Carnegie Public Library, $\frac{1}{2}$ meter from the building. (Note 1.*)

945 Highgrove.—At *Highgrove, Riverside County, Cal.*, at the south end of the depot park. (Note 18.*)

A₂.—At *Colton, San Bernardino County, Cal.*, on the east end of the lowest cement step at the main entrance to the Colton Grain & Milling Co.'s building. (Note 13.*)

B₂.—At *San Bernardino, San Bernardino County, Cal.*, about 1 mile southwest of the Atchison, Topeka & Santa Fe Railway station, at the southwest corner of the Walnut Street crossing, in the corner of a fence, and on land owned by the city of Colton. (Note 2.*)

1048 San Bernardino.—At *San Bernardino, San Bernardino County, Cal.*, in the stone foundation at the northwest corner of courthouse building. (Note 17.*)

C₂.—At *San Bernardino, San Bernardino County, Cal.*, on the south corner of the granite balustrade at the southeast side of the main entrance to the public library. (Note 13.*)

City.—At *San Bernardino, San Bernardino County, Cal.*, on the north side of Third Street near E Street, in the west end of the water table on the Katz Building. (Note 13.*)

D₂.—At *San Bernardino, San Bernardino County, Cal.*, 1 mile northeast of the Atchison, Topeka & Santa Fe Railway station; at the southeast corner of Ninth and I Streets; in the corner of a fence, on land owned by J. B. Schmitzen. (Note 2.*)

1420 S. B.—About 2.8 miles southward from *Verdemont, San Bernardino County, Cal.*, 50 feet east of the Atchison, Topeka & Santa Fe track at a point where three wagon roads pass over one common crossing. (Note 18.*)

E₂.—About 2.0 miles southeast of *Verdemont, San Bernardino County, Cal.*, on the sloping surface of the southwest end of the southeast concrete abutment of trestle B76 of the Atchison, Topeka & Santa Fe Railway. (Note 4.*)

F₂.—1 telegraph pole southeast of signboard at *Verdemont, San Bernardino County, Cal.*, and 15 meters southwest of the Atchison, Topeka & Santa Fe track. (Note 2.*)

G₂.—At *Devore, San Bernardino County, Cal.*, near the county road crossing, about 55 meters northwest of mile pole 71 and 13 meters east of the road, at the inside corner of a stone wall, on land owned by J. A. Devore. (Note 2.*)

2008 S. B.—About $\frac{1}{2}$ mile west of *Devore, San Bernardino County, Cal.*, at the northeast corner of the crossroads at the Glen Helen ranch. (Note 18.*)

H₂.—1 telegraph pole west of signboard at *Keenbrook, San Bernardino County, Cal.*, and 25 meters southeast of the road crossing. (Note 2.*)

I₂.—About $2\frac{1}{2}$ miles south of *Cajon, San Bernardino County, Cal.*, on the west side of the track, in the center of the coping of the large concrete arch bridge A66 of the Atchison, Topeka & Santa Fe Railway. (Note 1.*)

2768 S. B.—At *Dell, San Bernardino County, Cal.*, at the road station, inside of the garden fence east of the county road. (Note 18.*)

J₂.—At *Cajon, San Bernardino County, Cal.*, 18 meters northwest of the Atchison, Topeka & Santa Fe station, in the northwest end of the flower plat. (Note 11.*)

K₂.—About $\frac{1}{2}$ mile south of *Gish, San Bernardino County, Cal.*, 2 telegraph poles north of mile pole 60, and 12 meters west of the Atchison, Topeka & Santa Fe track. (Note 2.*)

3685 S. B.—About $4\frac{3}{4}$ miles north of *Cajon, San Bernardino County, Cal.*, on the west side of track, at a point where the county road recrosses the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

L₂.—At *Summit, San Bernardino County, Cal.*, at the northwest corner of the Atchison, Topeka & Santa Fe station and 9 meters northwest of the track. (Note 11.*)

M₂.—About $1\frac{3}{4}$ miles northeast of *Summit, San Bernardino County, Cal.*, at the road crossing, 1 telegraph pole southeast of mile pole 54, $\frac{3}{4}$ meter east of the Atchison, Topeka & Santa Fe Railway right of way. (Note 2.*)

3462 S. B.—2 miles north of *Summit, San Bernardino County, Cal.*, 13 meters west of the Atchison, Topeka & Santa Fe Railway track and 7 meters north of the second wagon road that crosses the railroad. (Note 18.*)

N₂.—About $1\frac{1}{4}$ miles south of *Hesperia, San Bernardino County, Cal.*, in the southeast corner of the reservoir tract of the Hesperia Land & Water Co., near a road crossing and 45 meters west of the Atchison, Topeka & Santa Fe track. (Note 2.*)

3190 S. B.—At *Hesperia, San Bernardino County, Cal.*, at the northeast corner of the brick hotel building. (Note 18.)

O₂.—At *Hesperia, San Bernardino County, Cal.*, near a road crossing 5 meters north of mile pole 45, and on range with the telegraph poles along the Atchison, Topeka & Santa Fe Railway. (Note 11.*)

2856 Hesperia.— $4\frac{3}{4}$ miles north of *Hesperia, San Bernardino County, Cal.*, the mark is a cross in the north end of the coping at the west end of the small cement culvert A41 of the Atchison, Topeka & Santa Fe Railway.

P₂.—About $1\frac{1}{2}$ miles south of *Victorville, San Bernardino County, Cal.*, $7\frac{1}{2}$ telegraph poles southeast of mile pole 38, at an offset in the Atchison, Topeka & Santa Fe Railway right of way fence. (Note 2.*)

2723 S. B.—At *Victorville, San Bernardino County, Cal.*, at the south corner of the road crossing near the first telegraph pole east of mile pole 37, 100 meters north of the wagon bridge over the Mojave River and 20 meters west of the Atchison, Topeka & Santa Fe Railway track. (Note 18.*)

Q₂.—At *Victorville, San Bernardino County, Cal.*, about 90 meters south of the Atchison, Topeka & Santa Fe Railway station, in the front face of the northerly corner of the cement stone building owned by J. C. Turner, $1\frac{1}{2}$ meters above the walk. (Note 1.*)

R₂.—At *Victorville, San Bernardino County, Cal.*, about 150 meters south of the Atchison, Topeka & Santa Fe Railway station, in the northeast corner of the public school grounds. (Note 11.*)

S₂.—About $\frac{1}{2}$ mile northwest of *Victorville, San Bernardino County, Cal.*, on the red sandstone base at the east side of the north end of steel trestle A37 of the Atchison, Topeka & Santa Fe Railway. (Note 15.*)

T₂.—At *Oro Grande, San Bernardino County, Cal.*, $\frac{1}{2}$ mile southeast of the Atchison, Topeka & Santa Fe Railway station, and 7 telegraph poles northwest of mile pole 32, in range with the poles. (Note 2.*)

U₂.—At *Oro Grande, San Bernardino County, Cal.*, east of the Atchison, Topeka & Santa Fe Railway station, in the public-school grounds, $\frac{1}{2}$ meter southwest of the south porch of the schoolhouse. (Note 11.*)

V₂.—About $2\frac{1}{2}$ miles northwest of *Oro Grande, San Bernardino County, Cal.*, on the westerly corner of concrete abutment to trestle A30 of the Atchison, Topeka & Santa Fe Railway right of way, $3\frac{2}{3}$ telegraph poles southeast of mile pole 29. (Note 14.*)

W₂.—About 5 miles south of *Helen, San Bernardino County, Cal.*, midway between the Atchison, Topeka & Santa Fe Railway track and the public road, opposite mile pole 26. (Note 2.*)

X₂.—About 3 miles south of *Helen, San Bernardino County, Cal.*, in the corner of the fence about 80 meters west of mile pole 24. (Note 2.*)

Y₂.—At *Helen, San Bernardino County, Cal.*, about 20 meters northeast of the water tank, on the Atchison, Topeka & Santa Fe Railway right of way, in range with the telegraph poles. (Note 11.*)

Z₂.—About $1\frac{1}{2}$ miles north of *Helen, San Bernardino County, Cal.*, in range with the telegraph poles on the Atchison, Topeka & Santa Fe Railway right of way at mile pole $19\frac{1}{2}$, and $1\frac{1}{2}$ meters above the rail. (Note 2.*)

A₃.—About $4\frac{1}{2}$ miles north of *Helen, San Bernardino County, Cal.*, in the center of the horizontal surface of the south coping of concrete culvert A17 of the Atchison, Topeka & Santa Fe Railway. (Note 14.*)

B₃.—About 2 miles southwest of *Cottonwood, San Bernardino County, Cal.*, 1 telegraph pole northeast of mile pole 14 on the Atchison, Topeka & Santa Fe Railway right of way, in range with poles. (Note 2.*)

C₃.—At *Cottonwood, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, $2\frac{1}{2}$ telegraph poles north of mile pole 12, at the northwest corner of the section house, $1\frac{1}{2}$ meters below the rail. (Note 11.*)

D₃.—About 2.0 miles north of *Cottonwood, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, 2 telegraph poles southwest of mile pole 10, in the center of the horizontal surface of the northwest coping of concrete culvert A11. (Note 14.*)

E₃.—About $3\frac{1}{2}$ miles north of *Cottonwood, San Bernardino County, Cal.*, in range with the telegraph poles on the Atchison, Topeka & Santa Fe Railway right of way, at mile pole $8\frac{1}{2}$. (Note 2.*)

F₃.—About $1\frac{1}{4}$ miles northeast of *Todd, San Bernardino County, Cal.*, at the road crossing, 11 meters southeast of the ninth telegraph pole northeast of mile pole 5. (Note 2.*)

G₃.—About 1 mile south of *Barstow, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, $1\frac{1}{2}$ telegraph poles south of mile pole 1, and $\frac{1}{4}$ meter from the north end of the horizontal surface of the east coping of concrete culvert A2, lettered "U. S." (Note 4.)*

H₃.—At *Barstow, San Bernardino County, Cal.*, about 215 meters west of the Atchison, Topeka & Santa Fe Railway station, $2\frac{1}{2}$ telegraph poles east of mile pole 747, 35 meters north of the railway track, in a fence corner, on land owned by Charles O'Donnell. (Note 11.)*

I₃.—At *Barstow, San Bernardino County, Cal.*, on the Atchison, Topeka & Santa Fe Railway right of way, on the northwest corner of the west concrete foundation, at the south end of the viaduct over the railroad tracks. (Note 1.)*

J₃.—At *Barstow, San Bernardino County, Cal.*, about 100 meters south of the Atchison, Topeka & Santa Fe Railway station, in the public-school grounds, at the southwest corner of the school building; set in cement. (Note 2.)*

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN POCATELLO, IDAHO, AND BUTTE, MONT., 1906.

A₃.—At *Pocatello, Bannock County, Idaho.* (See p. 169.)

B₃.—At *Pocatello, Bannock County, Idaho.* (See p. 169.)

L₃.—About $4\frac{1}{2}$ miles north of *Pocatello, Bannock County, Idaho*, on the Oregon Short Line Railroad right of way, 6 telegraph poles south of mile pole 139; at the east end of a stone culvert, on the north abutment, in the middle of the extreme coping. (Note 15.)*

M₃.—In *Bannock County, Idaho*, about $2\frac{1}{8}$ miles due south of *Ross Fork, Bingham County, Idaho*, opposite mile pole 143 $\frac{1}{2}$, 45 meters west of the Oregon Short Line Railroad right of way, at the angle of the telephone line, in the center of the four braced poles No. 358. (Note 2.)*

N₃.—At *Ross Fork, Bingham County, Idaho*, about 180 meters east of the Oregon Short Line Railroad station; in the south face of the Government warehouse, at the southwest corner, $1\frac{3}{4}$ meters above ground. (Note 1.)*

O₃.—At *Ross Fork, Bingham County, Idaho*, at the road crossing, about 100 meters north of the Oregon Short Line Railroad station, 45 meters west of the track, on land of the Fort Hall Indian Reservation. (Note 11.)*

P₃.—At *Gibson, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way at mile pole 151, 15 meters northwest of the signboard "Gibson." (Note 2.)*

Q₃.—About $2\frac{3}{4}$ miles south of *Blackfoot, Bingham County, Idaho*, at the road crossing, 12 telegraph poles north of mile pole 155, $\frac{1}{2}$ meter west of the Oregon Short Line Railroad right of way, in the southeast corner of the public road junction. (Note 2.)*

O. S. L. 4.—About 1 mile south of *Blackfoot, Bingham County, Idaho*, on the top of the southwest bolt of the southwest pedestal of girder bridge No. 619. *

R₃.—At *Blackfoot, Bingham County, Idaho*, at the Oregon Short Line Railroad water tank, on the northeast corner of the northeasterly foundation stone. (Note 16.)*

S₃.—At *Blackfoot, Bingham County, Idaho*, at the corner of East Main and Judicial Streets, in the northwest corner of the Bingham County courthouse grounds, 3 meters from the west fence. (Note 11.)*

T₃.—At *Blackfoot, Bingham County, Idaho*, on the north side of Bridge Street, at the southeast corner of the Odd Fellows' Hall, on the northeast corner of the projecting lava foundation. (Note 16.)*

U₃.—At *Blackfoot, Bingham County, Idaho*, on West Main Street in the D. W. Standrod & Co.'s bank building, on the vertical surface of the red sandstone window sill, at the north end. (Note 1.)*

V₃.—About $\frac{1}{3}$ mile south of *Wapello, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, $2\frac{1}{2}$ telegraph poles north of mile pole 163 $\frac{1}{2}$, 15 meters west of the track at the southwest corner of the road crossing. (Note 2.)*

W₃.—At *Wapello, Bingham County, Idaho*, at the road crossing, 35 meters west of signboard "Wapello," in range with the telephone poles. (Note 11.)*

X₃.—About 2 miles north of *Wapello, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, 45 meters northwest of mile pole 166; at the northwest corner of the road crossing. (Note 2.)*

Y₃.—At *Firth, Bingham County, Idaho*, 30 meters northwest of signboard "Firth," on the north side of the public road, in range with the telephone poles. (Note 2.)*

Z₃.—At *Firth, Bingham County, Idaho*, $\frac{1}{4}$ mile northeast of signboard "Firth," on the base of the westerly central iron column of the Oregon Short Line Railroad water tank. (Note 13.)*

A₇.—At *Monroe, Bingham County, Idaho*, $4\frac{1}{2}$ telegraph poles north of signboard "Monroe," at the road crossing, in the northeast corner of the junction of the two highways, $\frac{2}{3}$ meter west of the Oregon Short Line Railroad right of way. (Note 2.)*

B₇.—About $1\frac{1}{2}$ miles north of *Monroe, Bingham County, Idaho*, 3 telegraph poles south of mile pole 174 of the Oregon Short Line Railroad, near the edge of the horizontal surface of the north abutment of a stone culvert, at the west end. (Note 15.)*

C₇.—At *Shelley, Bingham County, Idaho*, on Main Street, opposite the Oregon Short Line Railroad station, in the front face at the northeast corner of the Shelley Banking Co.'s building, 1 meter above the walk. (Note 1.)*

D₇.—At *Shelley, Bingham County, Idaho*, in the center of the southeast section of the public-school grounds, 25 meters southeast of the main entrance to the school building. (Note 2.)*

* See pp. 162-166.

E₇.—About $3\frac{1}{2}$ miles south of *Idaho Falls, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, at the road crossing, 5 telegraph poles north of mile pole 180, 15 meters west of the track. (Note 11.*)

O. S. L. 7.—At *Idaho Falls, Bingham County, Idaho*, on the north column on the west side of the Oregon Short Line Railroad water tank; on the highest point of the nut on the pin through the brace.

F₇.—At *Idaho Falls, Bingham County, Idaho*, at the northeast corner of Water Avenue and Walnut Street, in the public high-school building, on the east side of the main entrance, in the vertical surface of the stone, 1 meter above the ground. (Note 1.*)

G₇.—At *Idaho Falls, Bingham County, Idaho*, at the corner of Broadway and Sharp Streets, at the northwest corner of the building owned by Crow & Changnon, on the northwest corner of the projecting stone foundation. (Note 14.*)

City.—At *Idaho Falls, Bingham County, Idaho*, at the east door of the Clark-Fanning Building; a cross cut in the east end of the stone sill and lettered "B.M."

H₇.—At *Idaho Falls, Bingham County, Idaho*, in the building used as the post office, in the front face, at the southeast corner, $1\frac{1}{2}$ meters above the walk. (Note 4.*)

O. S. L. 6.—At *Idaho Falls, Bingham County, Idaho*, on the east end of the south end pin of the east truss of the south span of bridge 623 over the Snake River. (These directions are based on the assumption that the railroad line toward Butte runs northward.)

I₇.—About $2\frac{3}{4}$ miles south of *Payne, Bingham County, Idaho*, on the Oregon Short Line Railroad right of way, $3\frac{1}{2}$ telegraph poles south of mile pole 188, in the center of the horizontal surface of the second step from the top, at the west end of the south abutment of a trestle. (Note 5.*)

J₇.—About $1\frac{1}{4}$ miles northwest of *Payne, Bingham County, Idaho*, at Payne post office, on the River Lea Ranch, owned by C. C. Wilson, opposite the tenth telegraph pole southeast of mile pole 192, in the north corner of the yard. (Note 2.*)

K₇.—About $2\frac{1}{2}$ mile northwest of *Bassett, Fremont County, Idaho*, at the north corner of the road crossing, 7 telegraph poles northwest of mile pole 196, $\frac{1}{2}$ meter northeast of the Oregon Short Line Railroad right of way, in the corner of a fence. (Note 2.*)

L₇.—At *Market Lake, Fremont County, Idaho*, $\frac{1}{4}$ mile west of the Oregon Short Line Railroad, at the main entrance to the public-school building, in the center of the horizontal surface of the top stone step. (Note 1.*)

M₇.—At *Market Lake, Fremont County, Idaho*, on the Oregon Short Line Railroad water tank, 35 meters north of the station, in the center, on the west side of the slanting surface of the northwest foundation. (Note 15.)

N₇.—About $\frac{4}{5}$ mile north of *Market Lake, Fremont County, Idaho*, 3 telegraph poles north of mile pole 202, in the center of the highest surface, on the west end of the south concrete abutment of the Oregon Short Line Railroad steel trestle 627. (Note 14.*)

O₇.—About $4\frac{1}{4}$ miles north of *Market Lake, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, at the first telegraph pole south of mile pole 205 $\frac{1}{2}$, 17 meters east of the track, on the highest point of a large lava rock 3 meters above the ground. (Note 15.*)

O. S. L. 8.—Near *Hawgood, Fremont County, Idaho*, a spike in mile marker 209.

P₇.—About $1\frac{2}{3}$ miles southeast of *Hawgood, Fremont County, Idaho*, 15 meters northeast of mile pole 210, $\frac{1}{2}$ meter outside the Oregon Short Line Railroad right-of-way fence. (Note 11.*)

Q₇.—At *Hawgood, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, 23 meters east of signboard "Hawgood," 14 meters northeast of the track, in range with the telegraph poles. (Note 11,* except post is only $2\frac{1}{2}$ feet long.)

R₇.—At *Hamer, Fremont County, Idaho*, 25 meters southwest of signboard "Hamer" in range with the telegraph poles, outside the Oregon Short Line Railroad right of way. (Note 11.*)

S₇.—About $2\frac{2}{3}$ miles south of *Camas, Fremont County, Idaho*, 19 meters east of mile pole 220, and $\frac{3}{4}$ meter east of the Oregon Short Line Railroad right of way. (Note 52.*)

T₇.—At *Camas, Fremont County, Idaho*, on the north corner of the most northern foundation stone of the Oregon Short Line Railroad water tank, 4 meters southwest of the center of the track. (Note 13.*)

U₇.—About $2\frac{1}{4}$ miles north of *Camas, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, 4 telegraph poles south of mile pole 225, on the southwest corner of the west coping of a stone culvert. (Note 16.*)

V₇.—At *Jones, Fremont County, Idaho*, 30 meters west of signboard "Jones," $\frac{1}{2}$ meter west of the Oregon Short Line Railroad right of way. (Note 11.*)

W₇.—About $1\frac{4}{5}$ miles north of *Jones, Fremont County, Idaho*, $3\frac{1}{2}$ telegraph poles north of mile pole 229 $\frac{1}{2}$, at the northeast corner of the road crossing, $\frac{1}{2}$ meter east of the Oregon Short Line Railroad right of way. (Note 52.*)

X₇.—At *Dubois, Fremont County, Idaho*, 95 meters south of the Oregon Short Line Railroad station, opposite the freight depot, in the east corner of the public-school grounds. (Note 11.*)

Y₇.—At *Dubois, Fremont County, Idaho*, 40 meters north of the station, in the center of the west side of the northwest foundation stone, of the Oregon Short Line Railroad water tank, 4 meters east of the center of the track. (Note 5.*)

Z₇.—About 1 mile south of *High Bridge, Fremont County, Idaho*, in range with the telegraph poles on the Oregon Short Line Railroad right of way, 13 meters east of signboard "High Bridge, 1 mile," $\frac{2}{5}$ meter below the level of the rail. (Note 2.*)

A₈.—About $\frac{1}{3}$ mile south of *High Bridge, Fremont County, Idaho*, 2 telegraph poles north of mile pole 242, 10 meters north of the southwest corner of the road crossing, $\frac{2}{5}$ meter west of the Oregon Short Line Railroad right of way. (Note 11.*)

B₈.—At *High Bridge, Fremont County, Idaho*, $\frac{4}{5}$ mile north of signboard "High Bridge," $8\frac{1}{2}$ telegraph poles north of mile pole 243, on the horizontal surface at the north end of the west coping of the large Oregon Short Line Railroad stone culvert, 10 meters below the level of the rail. (Note 1.*)

O. S. L. 10.—At *High Bridge, Fremont County, Idaho*, on the bottom sill of the water tank.

C₈.—About 2 miles south of *Spencer, Fremont County, Idaho*, at *China Point*, 40 meters east of mile pole 246, in the north corner of the road crossing, 30 meters northeast of the Oregon Short Line Railroad track. (Note 2.*)

D₈.—At *Spencer, Fremont County, Idaho*, 65 meters southwest of the Oregon Short Line Railroad station, 11 meters north of the north corner of the public-school building. (Note 11.*)

E₈.—At *Spencer, Fremont County, Idaho*, 35 meters northeast of the Oregon Short Line Railroad, at the west corner, in the southwest face of the building owned by the Spencer Harwood Company, 1 meter above the walk. (Note 1.*)

O. S. L. 11.—At *Spencer, Fremont County, Idaho*, 40 meters west of the station on the east corner of the most easterly foundation stone of the Oregon Short Line Railroad water tank, 4 meters southwest of the center of the track. (Note 14.*)

F₈.—About $1\frac{3}{4}$ miles north of *Spencer, Fremont County, Idaho*, 10 telegraph poles southeast of mile pole 250, on the Oregon Short Line Railroad right of way, in the center of the horizontal surface of the northeast end of the south-east concrete abutment of trestle No. 642. (Note 4.*)

G₈.—About $3\frac{3}{4}$ miles north of *Spencer, Fremont County, Idaho*, in beaver canyon at the old discontinued station "Beaver," about 15 meters east of the Oregon Short Line Railroad track, on the public highway at the northeast corner of the road crossing. (Note 2.*)

H₈.—About $3\frac{3}{4}$ miles southeast of *Humphrey, Fremont County, Idaho*, at the third telegraph pole south of mile pole 253, on the Oregon Short Line Railroad right of way, $2\frac{1}{3}$ meters from the east end of the south concrete abutment of trestle No. 645 $\frac{1}{2}$, 1 meter below the base of the rail. (Note 16.*)

I₈.—At *Humphrey, Fremont County, Idaho*, on the Oregon Short Line Railroad right of way, in range with the telegraph poles at the ninth pole south of the station, 8 meters east of the center of the track. (Note 2.*)

J₈.—At *Humphrey, Fremont County, Idaho*, on the Oregon Short Line Railroad 50 meters north of the station, on the northeast corner of the northeasterly foundation stone of the railroad water tank, 4 meters west of the center of the track. (Note 5.*)

K₈.—In *Fremont County, Idaho*, $2\frac{1}{4}$ miles east of *Monida, Beaverhead County, Mont.*, 17 meters northeast of mile pole 262, $\frac{3}{4}$ meter northeast of the Oregon Short Line Railroad right of way. (Note 2.*)

A.—At *Monida, Beaverhead County, Mont.*, 50 meters west of the station on the Oregon Short Line Railroad, on the center of the south side of the southwestern foundation stone of the railroad water tank, 4 meters north of the center of the track. (Note 14.*)

B.—At *Monida, Beaverhead County, Mont.*, 100 meters northwest of the Oregon Short Line Railroad station, $\frac{1}{2}$ meter west of the telephone pole at the southwest corner of the building owned by B. H. Paul. (Note 11.*)

C.—About $3\frac{3}{4}$ miles west of *Monida, Beaverhead County, Mont.*, $1\frac{1}{3}$ telegraph poles east of mile pole 268, $\frac{1}{3}$ meter north of the Oregon Short Line Railroad right of way, in range with the telephone poles; set in fine gravel. (Note 2.*)

D.—East of *Williams, Beaverhead County, Mont.*, on the Oregon Short Line Railroad right of way 4 telegraph poles west of mile pole 270, on the northwest corner of the north coping of a stone culvert, 1 meter below the base of the rail. (Note 16.*)

E.—At *Williams, Beaverhead County, Mont.*, 65 meters east of the signboard "Williams" on the Oregon Short Line Railroad, on the southeast corner of the southeast foundation stone of the railroad water tank, 4 meters north of the center of the track. (Note 5.*)

F.—About $\frac{4}{5}$ mile west of *Williams, Beaverhead County, Mont.*, $6\frac{1}{2}$ telegraph poles west of mile pole 273, at the northwest corner of the road crossing, $\frac{3}{4}$ meter north of the Oregon Short Line Railroad right of way, in range with the telephone poles. (Note 2.*)

G.—About $3\frac{1}{2}$ miles west of *Williams, Beaverhead County, Mont.*, on the Oregon Short Line Railroad right of way 2 telegraph poles east of mile pole 276, 3 meters south of the north end of the east concrete abutment of trestle No. 675, 1 meter below the base of the rail. (Note 16.*)

H.—At *Lima, Beaverhead County, Mont.*, about 155 meters southwest of the main track of the Oregon Short Line Railroad, 60 meters east of the east corner of the public-school building, in the east corner of the grounds. (Note 11.*)

O. S. L. 14.—At *Lima, Beaverhead County, Mont.*, on the Oregon Short Line Railroad station (wooden), at the south corner, on the southeast side of the bay window, 1 meter above ground, the lower edge of a horizontal scratch in the wood, marked "7-17-97, No. 1."

I.—At *Lima, Beaverhead County, Mont.*, on the Oregon Short Line Railroad, 65 meters northeast of the station, on the southwest end of the middle southeast concrete foundation of the railroad water tank. (Note 4.*)

J.—About $3\frac{1}{2}$ miles east of *Dell, Beaverhead County, Mont.*, 1 telegraph pole west of mile pole 284, $\frac{1}{2}$ meter north of the Oregon Short Line Railroad right of way. (Note 2.*)

K.—About $1\frac{1}{4}$ miles southeast of *Dell, Beaverhead County, Mont.*, on the Oregon Short Line Railroad right of way, 4 telegraph poles east of mile pole 286 $\frac{1}{2}$ on the west abutment of trestle No. 683, 4 meters south of the center of the track. (Note 13.*)

L.—At *Dell, Beaverhead County, Mont.*, on the Oregon Short Line Railroad 50 meters southeast of the station, on the east corner of the most easterly foundation stone of the railroad water tank, $4\frac{1}{3}$ meters southwest of the center of the track. (Note 15.*)

* See pp. 162-166.

M.—At *Dell, Beaverhead County, Mont.*, $\frac{1}{4}$ mile northwest of the Oregon Short Line Railroad station, 50 meters northeast of the track, in the south corner of the public-school grounds, 23 meters southeast of the building. (Note 11.*)

N.—About $1\frac{1}{5}$ miles southeast of *Crab Tree, Beaverhead County, Mont.*, 17 meters northeast of mile pole 292, 1 meter northeast of the Oregon Short Line Railroad right of way. (Note 2.*)

O.—At *Crab Tree, Beaverhead County, Mont.*, opposite the Oregon Short Line Railroad station, 30 meters southwest of the track, $\frac{3}{8}$ meter southwest of the right of way. (Note 11.*)

P.—About $4\frac{1}{2}$ miles northwest of *Crab Tree, Beaverhead County, Mont.*, 2 meters northeast of the fifth pole north of mile pole 298, on the Oregon Short Line Railroad right of way, 18 meters from the track and 1 meter below the base of the rail. (Note 2.*)

Q.—At *Red Rock, Beaverhead County, Mont.*, 40 meters southeast of the Oregon Short Line Railroad station on the east corner of the most easterly foundation stone of the railway water tank, 4 meters southwest of the center of the main track. (Note 5.*)

R.—At *Red Rock, Beaverhead County, Mont.*, 40 meters northeast of and directly opposite the Oregon Short Line Railroad station, $\frac{3}{4}$ meter northeast of the telephone pole at the west corner of the property owned by J. Shineberger. (Note 11.*)

S.—At *Armstead, Beaverhead County, Mont.*, 3 poles northwest of mile pole 306 $\frac{1}{2}$, 30 meters southwest of the Oregon Short Line Railroad right of way, 40 meters southwest of the track, 1 meter below the base of the rail, on a rough-shaped stone set $\frac{1}{5}$ meter in black loamy soil, on land owned by J. W. Scott. (Note 16.*)

T.—About $2\frac{1}{2}$ miles north of *Armstead, Beaverhead County, Mont.*, $1\frac{3}{4}$ telegraph poles southwest of mile pole 309, 12 meters west of the Oregon Short Line Railroad track, and $\frac{1}{2}$ meter west of the right of way, 2 meters above the base of the rail. (Note 2.*)

U.—About 2 miles south of *Grayling, Beaverhead County, Mont.*, $6\frac{1}{2}$ telegraph poles south of mile pole 310 $\frac{1}{2}$, in a horizontal concrete surface near the west end of the south abutment of the Oregon Short Line Railroad's riveted steel-truss bridge No. 696. (Note 4.*)

V.—At *Grayling, Beaverhead County, Mont.*, 20 meters west of and directly opposite signboard "Grayling," $\frac{1}{2}$ meter west of the Oregon Short Line Railroad right of way, 1 meter below the base of the rail. (Note 11.*)

W.—About $1\frac{1}{4}$ miles south of *Barratts, Beaverhead County, Mont.*, $6\frac{1}{2}$ telegraph poles north of mile pole 318 $\frac{1}{2}$; at the west end of the south abutment of the Oregon Short Line Railroad riveted steel-truss bridge No. 703; in the horizontal surface of the top concrete step 1 meter from the west end, 2 meters from the track. (Note 13.*)

X.—About 3 miles north of *Barratts, Beaverhead County, Mont.*, $3\frac{1}{4}$ telegraph poles north of mile pole 323; 10 meters west of the Oregon Short Line Railroad track, $\frac{1}{2}$ meter west of the right of way, on property owned by Benj. Taylor. (Note 11.*)

Y.—About 3 miles south of *Dillon, Beaverhead County, Mont.*, 5 telegraph poles south of mile pole 324 $\frac{1}{2}$, on the south abutment of the Oregon Short Line Railroad bridge 707 $\frac{1}{2}$; in the horizontal stone surface of the west end of the top step, $2\frac{1}{2}$ meters west of the track. (Note 16.*)

O. S. L. 16.—At *Dillon, Beaverhead County, Mont.*, on the Oregon Short Line Railroad, 30 meters south of the station on the southwest corner of the most southerly foundation stone of the railroad water tank, outside the railroad park lot 3 meters west of the track. (Note 16.*)

Z or Magnetic Station.—At *Dillon, Beaverhead County, Mont.*, 70 meters southwest of the northeast corner of the grounds of the State Normal College, 65 meters southeast of the southeast corner of the most northerly dormitory building, 130 meters east of the entrance to the main building; a 6-inch glazed pipe about 10 inches in diameter, filled with cement set flush with the ground and marked "U. S. C. & G. S. 1905." The bench mark is a 1-centimeter outlined square scratched between the center and the "19."

A₂.—At *Dillon, Beaverhead County, Mont.*, in the center of the water sill of the county courthouse, on Bannock Street, at the end of Pacific Street, 3 meters south of the center of the main steps, 1 meter above the sidewalk. (Note 1.*)

B₂.—At *Dillon, Beaverhead County, Mont.*, at the southeast corner of the block occupied by the county high school, on the northwest corner of Center and Atlantic Streets; $\frac{1}{2}$ meter from either sidewalk and inside the wire fence inclosing the high-school block. (Note 2.*)

City.—At *Dillon, Beaverhead County, Mont.*, on the top granite step of the Pacific Street entrance to the county high-school building, 8 meters from the center of the sidewalk. The point determined in 1906 was the extreme southwest corner of the step, approximately on a level with a ledge cut into the building stone and above which was cut "5197.60."

C₂.—About 2 miles southwest of *Bond, Beaverhead County, Mont.*, 1 telegraph pole north of mile pole 332, 28 meters east of the track and $\frac{3}{8}$ meter east of the Oregon Short Line Railroad right of way. (Note 2.*)

D₂.—At *Bond, Beaverhead County, Mont.*, 20 meters northeast of and directly opposite signboard "Bond," on the Oregon Short Line Railroad, in a line with the signboard and mile post 334, $\frac{1}{2}$ meter east of the right of way, on property owned by Nels P. Nelson. (Note 11.*)

E₂.—About $2\frac{1}{2}$ miles southeast of *Apex, Beaverhead County, Mont.*, 3 telegraph poles northwest of mile pole 337 $\frac{1}{2}$, at the southeast corner of the public road crossing, in a fence corner, on property owned by J. E. Morse; 24 meters east of the Oregon Short Line Railroad track and $\frac{3}{8}$ meter east of the right of way. (Note 2.*)

F₂.—At *Apex, Beaverhead County, Mont.*, 32 meters west of and directly opposite signboard "Apex," on the Oregon Short Line Railroad, $\frac{1}{2}$ meter west of the right of way, on property owned by J. E. Morse. (Note 2.*)

G₂.—About $2\frac{1}{4}$ miles southeast of *Glen, Beaverhead County, Mont.*, on the Oregon Short Line Railroad, opposite mile pole 346, 15 meters southeast of the track and $\frac{3}{8}$ meter west of the right of way. (Note 2.*)

H₂.—At *Glen, Beaverhead County, Mont.*, 25 meters east of and directly opposite signboard "Glen," on the Oregon Short Line Railroad, $8\frac{1}{2}$ telegraph poles northwest of mile pole 348, $\frac{3}{8}$ meter east of the right of way, $1\frac{1}{2}$ meters below the base of the rail, on property belonging to the estate of Joseph A. Browne. (Note 11.*)

I₂.—At *Glen, Beaverhead County, Mont.*, 110 meters northwest of the signboard "Glen" on the Oregon Short Line Railroad on the northwest corner of the most northerly of the two most westerly foundation stones of the Oregon Short Line Railroad water tank, 3 meters east of the track and $\frac{1}{2}$ meter above the base of the rail. (Note 15.*)

J₂.—About $\frac{1}{2}$ mile south of *Lavon, Madison County, Mont.*, $3\frac{3}{4}$ telegraph poles southwest of mile pole 351, on the north abutment of the deck plate-girder approach of the Oregon Short Line Railroad pin-connected truss bridge 724; at the east end of the top step, 3 meters east of the track and $\frac{1}{4}$ meter below the base of the rail. (Note 4.*)

K₂.—At *Lavon, Madison County, Mont.*, about 325 meters northwest of signboard "Lavon" on the Oregon Short Line Railroad opposite the railway park 15 meters east of the track and $\frac{1}{2}$ meter east of the right of way, on property belonging to the estate of Joseph A. Browne. (Note 2.*)

L₂.—At *Browne, Madison County, Mont.*, 20 meters north of the station on the Oregon Short Line Railroad, opposite Browne's bridge, 18 meters northeast of the public road crossing, 11 meters east of the right of way. (Note 11.*)

M₂.—About $2\frac{1}{2}$ miles southeast of *Melrose, Silver Bow County, Mont.*, $1\frac{1}{2}$ meters east of the first telegraph pole north of mile pole 356; on the right of way, 12 meters east of the Oregon Short Line Railroad track, and $\frac{3}{8}$ meter below the base of the rail. (Note 2.*)

N₂.—At *Melrose, Silver Bow County, Mont.*, 50 meters southeast of the Oregon Short Line Railroad station, on the southeast corner of the more southerly of the two most easterly foundation stones of the railroad water tank, 4 meters southwest of the track and $\frac{1}{2}$ meter above the base of the rail. (Note 5.*)

O₂.—At *Melrose, Silver Bow County, Mont.*, at the southwest corner of Broad and Hecla Streets, 175 meters southwest of the Oregon Short Line Railroad station, in the northeast corner of the public schoolhouse lot, $\frac{3}{8}$ meter inside the wire fence. (Note 11.*)

P₂.—About $1\frac{1}{2}$ miles southeast of *Big Hole, Silver Bow County, Mont.*, $2\frac{1}{2}$ telegraph poles northwest of mile pole 363, 20 meters east of the Oregon Short Line Railroad track, and $\frac{1}{2}$ meter east of the right of way. (Note 2.*)

Q₂.—At *Big Hole, Silver Bow County, Mont.*, $2\frac{2}{3}$ telegraph poles west of mile pole $364\frac{1}{2}$, 25 meters south of and directly opposite signboard "Big Hole" on the Oregon Short Line Railroad, 2 meters below the base of the rail. (Note 11.*)

R₂.—At *Maiden Rock, Silver Bow County, Mont.*, 43 meters east of the station platform, $7\frac{1}{2}$ telegraph poles south of mile pole 366, on the southeast corner of the north coping of a red sandstone culvert (unnumbered) on the Oregon Short Line Railroad, 3 meters east of the track. (Note 13.*)

S₂.—About 2 miles south of *Divide, Silver Bow County, Mont.*, 15 meters east of the Oregon Short Line Railroad track, 1 meter east of the right of way, and $2\frac{1}{2}$ meters below the base of the rail. (Note 2.*)

T₂.—At *Divide, Silver Bow County, Mont.*, 16 meters west of the Oregon Short Line Railroad station and directly opposite the semaphore pole, in the right of way, $\frac{1}{2}$ meter below the base of the rail. (Note 2.*)

U₂.—At *Woodin, Silver Bow County, Mont.*, 29 meters due east of signboard "Woodin," 26 meters east of the Oregon Short Line Railroad track, and $\frac{1}{2}$ meter east of the right of way. (Note 2.*)

V₂.—About $\frac{1}{2}$ mile north of *Woodin, Silver Bow County, Mont.*, $3\frac{2}{3}$ telegraph poles south of mile pole $374\frac{1}{2}$, on the northeast corner of the more northerly of the two most easterly foundation stones of the Oregon Short Line Railroad water tank, 3 meters west of the track and $\frac{1}{2}$ meter above the base of the rail. (Note 16.*)

W₂.—At *Beaudines Spur, Silver Bow County, Mont.*, 21 meters east of the signboard "Beaudines," 60 meters north of the public crossing, 17 meters east of the Oregon Short Line Railroad track, 1 meter east of the right of way. (Note 2.*)

X₂.—At *Feely, Silver Bow County, Mont.*, 35 meters west of the station on the Oregon Short Line Railroad and opposite the semaphore pole, 4 meters south of the public road crossing, $\frac{3}{8}$ meter west of the right of way. (Note 2.*)

Y₂.—About 1 mile south of *Buxton, Silver Bow County, Mont.*, 3 telegraph poles south of mile pole $383\frac{1}{2}$, on the north stone abutment of the Oregon Short Line Railroad plate-girder bridge (unnumbered), in the center of the top step at the east end, $\frac{1}{4}$ meter from the end of the step, 3 meters east of the track and $\frac{1}{4}$ meter below the base of the rail. (Note 16.*)

O. S. L.—About 1 mile south of *Buxton, Silver Bow County, Mont.*, on the southeast corner of the same end of the same abutment to the bridge on which Y₂ is located; a cross scratched on the stone.

Z₂.—At *Buxton, Silver Bow County, Mont.*, about 120 meters northeast of the signboard "Buxton," directly opposite the first telegraph pole northeast of mile pole $384\frac{1}{2}$, 15 meters northwest of the Oregon Short Line Railroad track, $\frac{3}{8}$ meter west of the right of way. (Note 2.*)

A₃.—At *Silver Bow, Silver Bow County, Mont.*, about 45 meters southeast of "Silver Bow Junction," a station of the Oregon Short Line Railroad and the Northern Pacific Railway, about 40 meters south of the crossing of the county road and Oregon Short Line Railroad, 5 meters east of the county road. (Note 11.*)

5327 Butte.—At *Silver Bow, Silver Bow County, Mont.*, about 55 meters south of the Oregon Short Line and Northern Pacific Railway station "Silver Bow Junction;" about 50 meters south of the Oregon Short Line tracks at the county road crossing, 20 meters west of the county road, and 27 meters southwest of A₃. (Note 18.*)

5388 Butte.—Near *Butte, Silver Bow County, Mont.*, about 0.3 mile southeast of the Butte, Anaconda & Pacific Railway water tank at Rocker, about 45 meters southeast of the public road and the Northern Pacific Railway crossing, 28 meters south of the Northern Pacific Railway right of way. (Note 18.*)

B₃.—About 2¼ miles southwest of the Northern Pacific Railway depot at *Butte, Silver Bow County, Mont.*, about 14 meters northwest of the Northern Pacific Railway track at the public road crossing, on the top of a large black granite rock, 6 meters north of the right of way, 1 meter above the base of the rail. (Note 1.*)

C₃.—About 1½ miles southwest of the Northern Pacific Railway depot at *Butte, Silver Bow County, Mont.*, about 17 meters south of a road crossing of the Northern Pacific Railway track, at the northwest corner of the grounds of the Colorado smelter (now in disuse), ⅔ meter west of the 8-foot board fence surrounding the smelter grounds. (Note 2.*)

5441 R. H. C.—At *Butte, Silver Bow County, Mont.*, in the store room of the electric lighting plant just south of the Northern Pacific Railway tracks. The bench mark is about 5 meters within the large doors which open on Montana street and is reached by raising a wooden lid about one-half meter square which covers the hole in the floor above the bench mark. (Note 17.*)

D₃.—At *Butte, Silver Bow County, Mont.*, about 10 meters southeast of the center of Front Street and ¼ meter north of the depot grounds, about 55 meters northwest of the Northern Pacific Railway tracks at the station. (Note 11.*)

E₃.—At *Butte, Silver Bow County, Mont.*, on the southeast corner of Iron and Wyoming Streets, in the stone foundation of the building occupied by the Butte Wholesale Grocery Co., 0.23 meter north of the southwest corner of the building, 1 meter above the sidewalk, and about 20 meters north of the northwest corner of the Butte, Anaconda & Pacific Railway depot. (Note 1.*)

5563 R. H. C.—At *Butte, Silver Bow County, Mont.*, at the entrance to the Webster School, located at the end of Idaho Street, on West Aluminum Street, one-half block west of Montana Street, in the horizontal top surface of the granite block at the foot of the balustrade, on the right-hand side upon entering the building, 1 meter above the sidewalk; an aluminum tablet set flush with the surface and marked "5563 R. H. C. '04." (Note 17.*)

5631 R. H. C.—At *Butte, Silver Bow County, Mont.*, at the entrance to the Garfield School on the southeast corner of Colorado and West Porphyry Streets, in the horizontal top surface of the granite block at the foot of the balustrade upon the left-hand side upon entering the building, 1 meter above the sidewalk; an aluminum tablet flush with the surface and marked "5631 R. H. C. '04." (Note 17.*)

5712 Butte.—At *Butte, Silver Bow County, Mont.*, in the Owsley block, at the northeast corner of Main and Park Streets, in the vertical surface of the corner stone, 0.17 meter east of the corner, 0.50 meter above the sidewalk, a horizontal mark on the end of a copper bolt, 1 inch in diameter, lettered "U. S. G. S. B. M. 5712 ft."

5767 R. H. C.—At *Butte, Silver Bow County, Mont.*, near the most southwesterly corner of the county courthouse, on Granite Street, about 60 meters east of Montana Street, 1 meter west of the sidewalk at the entrance to the office of the superintendent of schools, 0.55 meter above the ground, 1.32 meters east of the corner, in the vertical surface of a granite block and marked "5767 R. H. C., '04." (Note 17.*)

City.—At *Butte, Silver Bow County, Mont.*, on the county courthouse, on Granite Street about 60 meters east of Montana Street, on the most southwesterly corner, 0.15 meter north of the corner and 0.20 meter above the ground; a metal bolt presumably of brass, 0.5 inch in diameter, leaded into a small ledge cut out of the granite corner and projecting 1.5 centimeters above the ledge. Above the bench mark was cut into the stone "City B. M., elevation above sea 5,758 feet."

5811 R. H. C.—At *Butte, Silver Bow County, Mont.*, in the center of the horizontal surface of the corner of the coping at the northwest corner of the Government building, at the corner of North Main and West Copper Streets, 3.5 meters northwest of the corner of the building, 0.25 meter above the ground, and about 5 meters east of the center of the sidewalk; stamped "5811 R. H. C. '04." (Note 17.*)

5716 R. H. C.—At *Butte, Silver Bow County, Mont.*, at the Florence Hotel on Broadway, about 125 meters east of Arizona Street, in the horizontal top surface of a granite sill 6 meters west of the main entrance to the hotel, 0.60 meter above the sidewalk and 0.60 meter below the sill of the second window west of the entrance; set flush with the surface of the sill and marked "5716, R. H. C. '04." (Note 17.*)

5566 R. H. C.—At *Butte, Silver Bow County, Mont.*, on the Braund block, at the corner of Talbot and Watson Avenues, on the second door sill east of the southwest corner of the building, about 20 meters east of the corner and 3 inches above the level of the sidewalk; a metal disk set flush with the surface and stamped "5566 R. H. C. '04." (Note 17.*)

F₃.—At *Butte, Silver Bow County, Mont.*, in the southwest corner of the yard of the Monroe public school, corner of South Arizona and East First Streets, 2 meters southwest of the southwest corner of the building. (Note 2.*)

5485 R. H. C.—At *Butte, Silver Bow County, Mont.*, about 200 meters east of the station, 60 meters south of Front Street and 75 meters west of the Northern Pacific Railway bridge spanning the trolley line running along Front Street, about 15 meters north of the Northern Pacific Railway tracks, 4 meters west of the second telegraph pole west of the bridge; in the horizontal top surface of a granite block 6 by 8 by 36 inches, set 30 inches in the ground, stamped "5485 R. H. C. '04." (Note 17.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN OGDEN AND SALT LAKE CITY, UTAH, 1906.

C.—At *Ogden, Weber County, Utah*. (See p. 167.)

Transit.—At *Ogden, Weber County, Utah*. (See p. 167.)

A.—At *Ogden, Weber County, Utah*. (See p. 167.)

B.—At *Ogden, Weber County, Utah*. (See p. 167.)

A₁.—About 1½ miles south of *Evona, Weber County, Utah*, north of about the sixth telegraph pole north of milepost 3, 21 meters west of Oregon Short Line Railroad track, about 5 meters south of the public road, about 0.6 meter west of the right of way. (Note 11.*)

B₁.—About 1¼ miles north of *Roy, Weber County, Utah*, opposite milepost 5, 15 meters east of Oregon Short Line Railroad track and 0.6 meter west of the right-of-way fence. (Note 2.*)

C₁.—About ⅓ mile southeast of *Roy, Weber County, Utah*, opposite the second telegraph pole south of mile pole 6½, 21 meters east of the Oregon Short Line Railroad track, and 4 meters east of the right of way. (Note 11.*)

D₁.—About ½ mile southwest of *Syracuse Junction, Davis County, Utah*, in the southeast angle of the railway crossing of the Oregon Short Line Railroad and the Rio Grande Western Railway, 9 meters south of the Oregon Short Line track and 8 meters east of the Rio Grande Western track, ½ meter east of the Rio Grande Western right of way. (Note 11.*)

Salt Lake Northwest Base.—About 1½ miles north of *Syracuse Grove* and about 4 miles west of *Syracuse Junction, Davis County, Utah*, on pasture land owned by Jos. Holt, successor to Cato Love, about 360 meters east of the original site for the station of the Oregon Short Line Railroad, in the southeast angle of the crossroads, 51 meters from the fence on the north and 63 meters from the fence on the west; a copper bolt in the capstone of the monument which marks the base end, is about 9 feet high, and can be seen about ¼ mile. (Note 4.*)

Salt Lake Southeast Base.—About 4½ miles west of *Kaysville, Davis County, Utah*, in school section 16 T. 3 N., R. 2 W., about 5 miles southeast of the property of David Cook, Mormon bishop of the Syracuse ward, in a large pasture, about ⅓ mile west of the country road about 30 meters south of a barbed wire fence; a copper bolt in the capstone of the monument which marks the base end, is about 9 feet high, and can be seen about 2 miles. (Note 4.*)

K. S. 8.—About 1 mile east of *Syracuse, Davis County, Utah*, about 700 meters south of the Oregon Short Line Railroad spur track, about 100 meters north of the county road, in a pasture owned by Jas. T. Walker, about ¼ mile west of the residence of David Cook; a copper bolt in the stone marking the eighth kilometer from southeast base of the Salt Lake Base.

H₁.—About 2¼ miles northwest of *Layton, Davis County, Utah*, 7 meters northwest of the ninth telegraph pole southwest of mile pole 12, 18 meters northeast of Oregon Short Line Railroad track and 1 meter northeast of the right of way. (Note 2.*)

I₁.—At *Layton, Davis County, Utah*, 40 meters northeast of the Oregon Short Line Railroad track, at the entrance to the Farmers' Union General Merchandise Building on the southeast end of the doorsill, about 0.15 meter from the end and about 0.1 meter from the northeast edge. (Note 1.*)

J₁.—At *Kaysville, Davis County, Utah*, in the Oregon Short Line station grounds, about 18 meters west of the railway water tank, 31 meters east of the track, on the south side of a street leading eastward through the town. (Note 11.*)

K₁.—About 1½ miles northwest of *Farmington, Davis County, Utah*, opposite the second telegraph pole west of mile pole 20, 16 meters south of the Oregon Short Line Railroad track, and 1 meter south of the right of way, 2 meters east of and in line with pole 1003 of the Utah Light & Power Co. (Note 2.*)

L₁.—About ⅓ mile northwest of *Farmington, Davis County, Utah*, opposite the third telegraph pole southwest of mile pole 21, in the cement-covered stone coping of a red sandstone culvert, 2½ meters south of the Oregon Short Line Railroad track, and ¼ meter below the base of rail. (Note 16.*)

M₁.—At *Farmington, Davis County, Utah*, 28 meters northeast of the Oregon Short Line Railroad station, at the southeast side of a street leading through the town, 34 meters east of the track, and 2 meters east of the right of way. (Note 11.*)

N₁.—About 1.9 miles southeast of *Farmington, Davis County, Utah*, at the southeast corner of a road crossing, 14 meters southwest of the Oregon Short Line Railroad track and ¾ meters southwest of the right of way, about 2 meters southeast of and in line with pole 1186 of Utah Light & Power Co. Reported slightly disturbed in 1907. (Note 2.*)

O₁.—At *Centerville, Davis County, Utah*, about 31 meters southeast of the Oregon Short Line Railroad station, 17 meters east of the track, and 2½ meters east of the right of way, about 3 meters west of the wagon scales. (Note 11.*)

P₁.—At *Woods Cross, Davis County, Utah*, 20 meters southeast of the Oregon Short Line Railroad station, 8 meters east of the track, 11 meters west of the Deseret Live Stock Co.'s store. (Note 2.*)

Q₁.—At *Simkins, Davis County, Utah*, 28 meters southwest of signboard "Simkins," at the northeast corner of the road crossing, 15 meters east of the Oregon Short Line Railroad track and ¾ meter east of the right of way. (Note 11.*)

R₁.—At *Stock Yards Junction, Davis County, Utah*, 19 meters south of signboard "Stockyards Junction," at the southeast corner of road crossing, 8 meters east of the Oregon Short Line Railroad track and ½ meter east of the right of way. (Note 2.*)

S₁.—About 2½ miles north of *Salt Lake City, Salt Lake County, Utah*, in the northwest corner of the Bonneville school grounds, 54 meters west of the northwest corner of the building, 13 meters southeast of the second telegraph pole

southeast of mile pole 34, 28 meters northeast of the Oregon Short Line Railroad main track, $\frac{1}{2}$ meter northeast of the right of way. (Note 11.*)

T₁.—At *Salt Lake City, Salt Lake County, Utah*, on the southeast corner of South Temple and Third West Streets, 4 meters west of the saloon entrance in the Railroad Exchange Hotel Building, 65 meters southeast of the southeast corner of the Oregon Short Line Railroad passenger depot, $1\frac{1}{2}$ meters east of the curb on Third West, $5\frac{1}{2}$ meters south of the curb on South Temple Street. (Note 2.*)

U₁.—At *Salt Lake City, Salt Lake County, Utah*, at the southeast corner of South Temple and Main Streets, in the northeast corner of the stone foundation course of the building occupied by the State Bank of Utah, 0.5 meter south from the corner, 1.05 meters above walk. (Note 1.*)

V₁ (U. S. G. S. meridian mark).—At *Salt Lake City, Salt Lake County, Utah*, near the southeast corner of State and Fourth South Streets and near the northwest corner of the grounds of the city and county building, about 80 meters northwest of the northwest corner of the building, 18 meters east of the walk on State Street, and 16 meters south of the walk on Fourth South Street, a bronze disk stamped "Meridian Mark" and having a "+" in the center. (Note 17.*)

W₁.—At *Salt Lake City, Salt Lake County, Utah*, at the northeast corner of Third West and Fourth South Streets and the southwest corner of the Pioneer Park; on the southeast side of the diagonal drive through the park, 2 meters north of the wire fence and hedge on Fourth South Street and 6 meters east of the wire fence on Third West Street. (Note 11.*)

DESCRIPTION OF PERMANENT BENCH MARKS BETWEEN BARSTOW, CAL., AND LAS VEGAS, NEV., 1906.

H₂.—At *Barstow, San Bernardino County, Cal.* (See p. 193.)

I₂.—At *Barstow, San Bernardino County, Cal.* (See p. 193.)

J₂.—At *Barstow, San Bernardino County, Cal.* (See p.) 193.

K₂.—About 2 miles northwest of *Nebo, San Bernardino County, Cal.*, 9 telegraph poles southeast of milepost 744, 20 meters southwest of the Atchison, Topeka & Santa Fe Railway track, and about 1 meter southwest of the right of way; not lettered. (Note 11.*)

L₂.—About $1\frac{1}{4}$ miles southeast of *Nebo, San Bernardino County, Cal.*, $2\frac{1}{2}$ meters northwest of milepost 740 $\frac{1}{2}$, 16 meters south of the Atchison, Topeka & Santa Fe Railway track; set in sandy soil. (Note 2.*)

M₂.—At *Daggett, San Bernardino County, Cal.*, outside the southeast corner of the depot gardens, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, 35 meters east of the southeast corner of the depot, $\frac{1}{2}$ meter outside of the fence corner, composed of 3 rail connections bolted together, a chiseled cross to which the elevation refers being cut on top of the middle piece; set in sandy soil.

N₂.—About $3\frac{1}{4}$ miles east of *Daggett, San Bernardino County, Cal.*, 6 meters southwest of the second telegraph pole east of mile pole 734 $\frac{1}{2}$, 14 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

O₂.—At *Minneola, San Bernardino County, Cal.*, 45 meters southwest of signboard "Minneola," 32 meters north of the Atchison, Topeka & Santa Fe Railway track, opposite the seventh telegraph pole west of mile pole 731 $\frac{1}{2}$, a chisel-cut cross in the end of a piece of railroad rail, lettered "U. S."

P₂.—About 2.4 miles east of *Minneola, San Bernardino County, Cal.*, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, and 2 meters south of the sixth telegraph pole west of milepost 729. (Note 2.*)

Q₂.—At *Newberry, San Bernardino County, Cal.*, 26 meters west of the southeast corner of the Atchison, Topeka & Santa Fe Railway depot, 6 meters north of the railroad track, a piece of 80-pound railroad rail about $5\frac{1}{4}$ feet long, set on end, the top level with the base of the rail and marked by a chiseled cross and the letters "U. S."

R₂.—About $\frac{3}{4}$ mile east of *Newberry, San Bernardino County, Cal.*, 2 meters below the base of the rail, 26 meters west of the first telegraph pole west of mile pole 722 $\frac{1}{2}$, 12 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

S₂.—At *Troy, San Bernardino County, Cal.*, opposite the sixth telegraph pole east of mile pole 719 $\frac{1}{2}$, about 25 meters northeast of signboard "Troy," 17 meters north of the Atchison, Topeka & Santa Fe Railway track, a chiseled cross in the top of a piece of 80-pound railroad rail, about $5\frac{1}{2}$ feet long, set on end and having the top $7\frac{1}{2}$ meters below the base of the rail.

T₂.—About 3.6 miles east of *Troy, San Bernardino County, Cal.*, 5 meters west of mile pole 716, 15 meters south of the Atchison, Topeka & Santa Fe Railway track, 1 meter above the base of the rail. (Note 2.*)

U₂.—At *Hector, San Bernardino County, Cal.*, 23 meters east of signboard "Hector," outside the southeast corner of the station park fence, 7 meters north of the Atchison, Topeka & Santa Fe Railway track; set on a level with the base of the rail. (Note 11.*)

V₂.—About 2.6 miles northwest of *Pisgah, San Bernardino County, Cal.*, 4 meters southeast of the eighth telegraph pole east of mile pole 710, 18 meters south of the Atchison, Topeka & Santa Fe Railway track, 3 meters south of the right of way; set $\frac{3}{8}$ meter above the base of rail. (Note 2.*)

W₂.—At *Pisgah, San Bernardino County, Cal.*, 5 meters southeast of signboard "Pisgah," 11 meters northeast of the Atchison, Topeka & Santa Fe Railway track, 31 meters north of the sixth telegraph pole northeast of mile pole 707; set in sand and gravel, $\frac{1}{2}$ meter above the base of the rail. (Note 11.*)

X₃.—About 2¼ miles east of *Pisgah, San Bernardino County, Cal.*, 2 meters south of the second telegraph pole southeast of mile pole 705, 14 meters south of the Atchison, Topeka & Santa Fe Railway track; set in sandy soil, 1 meter above the base of the rail. (Note 2.*)

Y₃.—At *Lavic, San Bernardino County, Cal.*, at the northwest corner of the station platform, 38 meters west of the southeast corner of the Atchison, Topeka & Santa Fe Railway depot, 5 meters northeast of the railway track, ¼ meter above the base of the rail. (Note 11.*)

Z₃.—About 1.8 miles southeast of *Lavic, San Bernardino County, Cal.*, 3 meters southeast of the fifth telegraph pole southwest of mile pole 700½, 13 meters south of the Atchison, Topeka & Santa Fe Railway track; set in gravel ½ meter above the base of the rail. (Note 2.*)

A₄.—At *Arctic, San Bernardino County, Cal.*, 20 meters south of signboard "Arctic," 8 meters west of the first telegraph pole east of mile pole 698½, 14 meters south of the Atchison, Topeka & Santa Fe Railway track, ½ meter above the base of the rail. (Note 11.*)

B₄.—About 1¾ miles east of *Arctic, San Bernardino County, Cal.*, 5 meters southwest of the sixth telegraph pole east of mile pole 696½, 16 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

C₄.—About 1½ miles west of *Ludlow, San Bernardino County, Cal.*, 18 meters northwest of the sixth telegraph pole southwest of mile pole 694½, on the north wing of the northeast red sandstone abutment of bridge 695B, on the horizontal surface of the second step, 3½ meters north of the Atchison, Topeka & Santa Fe Railway track, ⅔ meter below the base of the rail. (Note 15.*)

D₄.—At *Ludlow, San Bernardino County, Cal.*, outside the northwest corner of the lot inclosing the section foreman's house, 49 meters north of the Atchison, Topeka & Santa Fe Railway track, 37 meters northeast of the northeast corner of the depot. (Note 11.*)

E₄.—About 1¾ miles northeast of *Ludlow, San Bernardino County, Cal.*, 3½ telegraph poles east of mile pole 692, on the north red sandstone coping of culvert 692D, in the horizontal surface of the northeast corner, 4 meters north of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 4*) lettered "U. S. B. M."

F₄.—About 2.8 miles west of *Ash Hill, San Bernardino County, Cal.*, 7 meters south of mile pole 689½, 17 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 2.*)

G₄.—At *Ash Hill, San Bernardino County, Cal.*, 6½ telegraph poles northwest of mile pole 656½, 31 meters east of signboard "Ash Hill," 16 meters northeast of the Atchison, Topeka & Santa Fe Railway track. (Note 11.*)

H₄.—About 1.9 miles east of *Ash Hill, San Bernardino County, Cal.*, 6½ telegraph poles east of mile pole 695, on the south wing of the southeast red sandstone abutment of bridge 695D, in the horizontal surface of the top step, 3 meters south of the Atchison, Topeka & Santa Fe Railway track, ⅓ meter below the base of the rail. (Note 16.*)

I₄.—About 2.1 meters northwest of *Klondike, San Bernardino County, Cal.*, 4 telegraph poles northwest of mile pole 654, on the north wing of the northeast red sandstone abutment of bridge 655A, in the horizontal surface, 3 meters northeast of the Atchison, Topeka & Santa Fe Railway track, ¼ meter below the base of the rail. (Note 15.*)

J₄.—About 1.1 miles northwest of *Klondike, San Bernardino County, Cal.*, 4 telegraph poles northeast of mile pole 683, 3 meters east of the Atchison, Topeka & Santa Fe Railway track, in the top horizontal surface of the east wing of the southeast (red sandstone) abutment of bridge 684A. (Note 13.*)

K₄.—At *Klondike, San Bernardino County, Cal.*, 23 meters northwest of mile pole 682, 7 meters south of signboard "Klondike," 13 meters southwest of the Atchison, Topeka & Santa Fe Railway track, and 2 meters below the base of the rail; set in sand and gravel. (Note 11.*)

L₄.—About 3 miles northwest of *Siberia, San Bernardino County, Cal.*, 45 meters east of the fifth telegraph pole northeast of mile pole 679, 26 meters northwest of the Atchison, Topeka & Santa Fe Railway track, 1¼ meters below the base of the rail. (Note 2.*)

M₄.—At *Siberia, San Bernardino County, Cal.*, 5 meters southwest of the signboard "Siberia," 15 meters northwest of the seventh telegraph pole northwest of mile pole 676½, 11 meters south of the Atchison, Topeka & Santa Fe Railway track. (Note 11.*)

N₄.—About 1¾ miles east of *Siberia, San Bernardino County, Cal.*, 50 meters northwest of the third telegraph pole southwest of mile pole 698½, 17 meters north of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail; set in sand and gravel. (Note 2.*)

O₄.—At *Nome, San Bernardino County, Cal.*, 10 meters northeast of the signboard, 35 meters north of the second telegraph pole east of mile pole 673, 15 meters east of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 11.*)

P₄.—About 1¾ miles east of *Nome, San Bernardino County, Cal.*, 3 meters southwest of the fourth telegraph pole west of mile pole 671, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, and 1¼ meters below the base of the rail. (Note 2.*)

Q₄.—At *Bagdad, San Bernardino County, Cal.*, 44 meters northeast of the northwest corner of the station building of the Atchison, Topeka & Santa Fe Railway, 50 miles north of the track, 1 meter west of the southwest corner of the fences inclosing the section foreman's house. (Note 11.*)

R₄.—About 3½ miles east of *Bagdad, San Bernardino County, Cal.*, 3 meters south of the first telegraph pole east of mile pole 665½, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail; set in sand and gravel. (Note 2.*)

* See pp. 162-166.

S₄.—At *Amboy, San Bernardino County, Cal.*, 35 meters southwest of the southwest corner of the station building, 17 meters south of the Atchison, Topeka & Santa Fe Railway track, and 1 meter below the base of the rail. (Note 11.*)

T₄.—About 2.1 miles southwest of *Bengal, San Bernardino County, Cal.*, 3 meters south of the fifth telegraph pole east of mile pole 657½, 18 meters south of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 2.*)

U₄.—At *Bengal, San Bernardino County, Cal.*, 85 meters northwest of the signboard, 35 meters northeast of the first telegraph pole west of mile pole 655, 15 meters north of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 2.*)

V₄.—About 3.9 miles west of *Cadiz, San Bernardino County, Cal.*, 4 meters southwest of the sixth telegraph pole west of mile pole 651, 14 meters south of the Atchison, Topeka & Santa Fe Railway track, and ½ meter below the base of the rail. (Note 2.*)

W₄.—About 1.6 miles west of *Cadiz, San Bernardino County, Cal.*, 5½ telegraph poles east of mile pole 649, 3 meters north of the Atchison, Topeka & Santa Fe Railway track, in the top horizontal surface of the north red sandstone coping of bridge 649B, ¾ meter below the base of the rail. (Note 16.*)

X₄.—At *Cadiz, San Bernardino County, Cal.*, 9 meters northeast of the signboard, 37 meters northwest of the ninth telegraph pole east of mile pole 647½, 12 meters north of the Atchison, Topeka & Santa Fe Railway track, and ½ meter below the base of the rail. (Note 11.*)

Y₄.—About 2.1 miles southwest of *Siam, San Bernardino County, Cal.*, 23 meters northeast of mile pole 644, 17 meters southeast of the Atchison, Topeka & Santa Fe Railway track, ½ meter below the base of the rail. (Note 2.*)

Z₄.—At *Siam, San Bernardino County, Cal.*, 5½ meters east of the seventh pole northeast of mile pole 642, 25 meters southeast of the signboard, 18 meters southeast of the Atchison, Topeka & Santa Fe Railway track. (Note 11.*)

A₅.—About 2¼ miles southwest of *Danby, San Bernardino County, Cal.*, 7 meters south of the seventh pole northeast of mile pole 638½, 12½ meters southeast of the Atchison, Topeka & Santa Fe Railway track, and ¼ meter below the base of the rail. (Note 2.*)

B₅.—At *Danby, San Bernardino County, Cal.*, 80 meters southwest of the southwest corner of the station building of the Atchison, Topeka & Santa Fe Railway, 41 meters west of the track. (Note 11.*)

C₅.—About 1.4 miles west of *Arimo, San Bernardino County, Cal.*, 32 meters north of the ninth pole northeast of mile pole 632 of the Atchison, Topeka & Santa Fe Railway, 16 meters northwest of the track, ½ meter below the base of the rail. (Note 2.*)

D₅.—At *Arimo, San Bernardino County, Cal.*, 39½ meters north of the sixth pole northeast of mile pole 630½ of the Atchison, Topeka & Santa Fe Railway, 10½ meters north of the signboard, 19½ meters northwest of the track, and 1 meter below the base of the rail. (Note 11.*)

E₅.—About 2.3 miles northeast of *Arimo, San Bernardino County, Cal.*, 5 meters east of mile pole 628 of the Atchison, Topeka & Santa Fe Railway, 15 meters southeast of the track, and ¼ meter below the base of the rail. (Note 2.*)

F₅.—At *Essex, San Bernardino County, Cal.*, 40 meters north of the ninth pole west of mile pole 625½, 10 meters northwest of the signboard on the Atchison, Topeka & Santa Fe Railway, 15 meters northwest of the track, ¼ meter below the base of the rail. (Note 11.*)

G₅.—About 3.4 miles southwest of *Fenner, San Bernardino County, Cal.*, 29 meters west of the sixth pole southwest of mile pole 622 of the Atchison, Topeka & Santa Fe Railway, 16 meters northwest of the track, and ½ meter below the base of the rail. (Note 2.*)

H₅.—At *Fenner, San Bernardino County, Cal.*, 41 meters east of the southwest corner of the station building of the Atchison, Topeka & Santa Fe Railway, 21 meters southeast of the track, on a level with the base of the rail. (Note 11.*)

I₅.—About 2.2 miles southwest of *Piute, San Bernardino County, Cal.*, 30 meters north of the seventh pole northeast of mile pole 616½ of the Atchison, Topeka & Santa Fe Railway, 14½ meters northeast of the track, ¼ meter below the base of the rail. (Note 2.*)

J₅.—At *Piute, San Bernardino County, Cal.*, 42 meters west of the seventh pole southwest of mile pole 614, 12 meters northwest of the signboard on the Atchison, Topeka & Santa Fe Railway, 17½ meters northwest of the track, and ¼ meter below the base of the rail. (Note 11.*)

K₅.—About 2.3 miles southwest of *Goffs, San Bernardino County, Cal.*, 27 meters west of the first pole southwest of mile pole 611½ of the Atchison, Topeka & Santa Fe Railway, 11 meters northwest of the track, ¼ meter below the base of the rail. (Note 2.*)

L₅.—At *Goffs, San Bernardino County, Cal.*, 19 meters northwest of the track of the Barnwell branch of the Atchison, Topeka & Santa Fe Railway, 41 meters northwest of the northwest corner of the station building, in front of the store of H. P. Ware, postmaster. (Note 11.*)

M₅.—About ¼ mile west of *Goffs, San Bernardino County, Cal.*, opposite the fourth pole east of mile pole 902½, near the "Y" of the Barnwell branch of the Atchison, Topeka & Santa Fe Railway track, and about 225 meters northwest of the main track and 200 meters southwest of the branch track. (Note 2.*)

N₅.—About 3.8 miles southeast of *Vontrigger, San Bernardino County, Cal.*, 13¾ poles southwest of mile pole 6 of the Atchison, Topeka & Santa Fe Railway, 18 meters northeast of the track, and on a level with the base of the rail; a piece of 50-pound railroad rail, about 5½ feet long, set on end on a large boulder, the top end bearing a chiseled "U+S" to which the elevation refers.

O₅.—At *Vontrigger, San Bernardino County, Cal.*, 9 meters northeast of the Atchison, Topeka & Santa Fe Railway track, $4\frac{1}{2}$ meters east of the east corner of the railway water tank. (Note 11.*)

P₅.—About 1.8 miles south of *Blackburn, San Bernardino County, Cal.*, 14 meters southwest of the Atchison, Topeka & Santa Fe Railway track, and $\frac{3}{8}$ meter below the base of the rail. (Note 2.*)

Q₅.—At *Blackburn, San Bernardino County, Cal.*, 8 meters southeast of signboard "Blackburn" on the Atchison, Topeka & Santa Fe Railway, 18 meters northeast of the track; set on a level with the base of the rail. (Note 11.*)

R₅.—About 4.7 miles south of *Ledge, San Bernardino County, Cal.*, $3\frac{1}{2}$ meters east of the tenth pole southeast of mile pole 18 of the Atchison, Topeka & Santa Fe Railway, and 15 meters northeast of the track; set on a level with the base of the rail. (Note 2.*)

S₅.—At *Ledge, San Bernardino County, Cal.*, $2\frac{1}{2}$ poles northwest of mile pole 22 of the Atchison, Topeka & Santa Fe Railway, 8 meters northwest of the track; set on a level with the base of the rail. (Note 11.*)

T₅.—About 0.9 mile north of *Ledge, San Bernardino County, Cal.*, 26 meters west of the second pole north of mile pole 23 of the Atchison, Topeka & Santa Fe Railway, 14 meters west of the track; set 1 meter above the base of the rail. (Note 2.*)

U₅.—At *Purdy, San Bernardino County, Cal.*, 7 meters northeast of mile pole 25 of the Atchison, Topeka & Santa Fe Railway, 15 meters northeast of the track; set on a level with the base of the rail. (Note 11.*)

V₅.—About 2.3 miles south of *Barnwell, San Bernardino County, Cal.*, opposite the seventh pole west of mile pole 27 of the Atchison, Topeka & Santa Fe Railway, 12 meters south of the track; set 1 meter above the base of the rail. (Note 2.*)

W₅.—At *Barnwell, San Bernardino County, Cal.*, 22 meters west of the "Menvel Hotel" entrance, 12 meters east of the east corner of the Atchison, Topeka & Santa Fe Railway freight-house platform, 19 meters southeast of the railway track; set on a level with the base of the rail. (Note 11.*)

X₅.—About 2 miles north of *Barnwell, San Bernardino County, Cal.*, $7\frac{1}{2}$ poles northwest of mile pole 31 of the Atchison, Topeka & Santa Fe Railway, 14 meters southwest of the track; set 2 meters below the base of the rail. (Note 2.*)

Y₅.—At *Vanderbilt, San Bernardino County, Cal.*, 4 poles west of mile pole 34 of the Atchison, Topeka & Santa Fe Railway, 15 meters north of the track; set $\frac{1}{2}$ meter below the base of the rail. (Note 11.*)

Z₅.—About 1.9 miles northwest of *Vanderbilt, San Bernardino County, Cal.*, about 0.1 mile north of tin mile-marker 36, on a tie of the Atchison, Topeka & Santa Fe Railway track, 22 meters northeast of the track; set $\frac{1}{2}$ meter above the base of the rail. (Note 2.*)

A₆.—At *Leastalk, San Bernardino County, Cal.*, 3 meters west of the thirteenth pole west of mile pole 268, in the north angle of the intersection of the Atchison, Topeka & Santa Fe Railway and the the San Pedro, Los Angeles & Salt Lake Railroad, 7 meters northwest of the former and 8 meters northeast of the latter, $1\frac{1}{2}$ meters below the base of the rail. (Note 11.*)

B₆.—About 2.3 miles north of *Leastalk, San Bernardino County, Cal.*, 6 meters west of the fourth pole southwest of mile pole 270, 15 meters northwest of the San Pedro, Los Angeles & Salt Lake Railroad track; set 1 meter below the base of the rail. (Note 2.*)

C₆.—At *Moore, San Bernardino County, Cal.*, 4 meters northwest of the second pole northeast of mile pole 272, 14 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track, opposite the signboard; set in gravel, 3 meters below the base of the rail. (Note 11.*)

D₆.—About 2.4 miles southeast of *Nipton, San Bernardino County, Cal.*, 4 meters northwest of the third pole north of mile pole 275, 15 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track; set 3 meters below the base of the rail. (Note 2.*)

E₆.—At *Nipton, San Bernardino County, Cal.*, 14 meters northeast of the San Pedro, Los Angeles & Salt Lake Railroad depot, 26 meters northeast of the railway track, 37 meters south of the post office and store of the Kuhn Mercantile Co.; set 1 meter below the base of the rail. (Note 11.*)

F₆.—About 2.5 miles northwest of *Nipton, San Bernardino County, Cal.*, $1\frac{1}{2}$ poles southeast of mile pole 280, 21 meters southwest of the San Pedro, Los Angeles & Salt Lake Railroad track; set $1\frac{1}{2}$ meters below the base of the rail. (Note 2.*)

G₆.—At *Lyons, San Bernardino County, Cal.*, $10\frac{1}{2}$ poles northwest of mile pole 282, 29 meters east of the signboard, 15 meters northeast of the San Pedro, Los Angeles & Salt Lake Railroad track; set $1\frac{1}{2}$ meters below the base of the rail. (Note 11.*)

H₆.—At *Calada, San Bernardino County, Cal.*, opposite the sixth pole northwest of mile pole 287, 46 meters southwest of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 25 meters southeast of the boundary post between San Bernardino County, Cal., and Lincoln County, Nev., 15 meters northeast of the track; set 1 meter below the base of the rail. (Note 11.*)

A. —At *Roach, Lincoln County, Nev.*, $12\frac{1}{2}$ poles south of mile pole 292, $1\frac{1}{2}$ poles north of the railway section foreman's house, 18 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track; set $1\frac{1}{2}$ meters below the base of the rail. (Note 11.*)

B. —At *Borax, Lincoln County, Nev.*, on the San Pedro, Los Angeles & Salt Lake Railroad, 21 meters east of the twelfth pole south of mile pole 297, $4\frac{1}{2}$ meters east of the railway track, on the horizontal surface of the northwest

corner of the most northwesterly of the 3 southerly concrete foundation piers to the steel water tank of the railroad, $\frac{1}{2}$ meter above the base of the rail. (Note 15.*)

C.—At *Jean, Lincoln County, Nev.*, $13\frac{1}{2}$ meters north of the third pole north of mile pole 301, 41 meters southwest of the southwest corner of the San Pedro, Los Angeles & Salt Lake Railroad depot, 17 meters west of the main railway track, 20 meters east and in front of the post office and store of Yount & Fayle; set in compact gravel, $\frac{1}{2}$ meter below the base of the rail. (Note 11.*)

D.—About 2.3 miles north of *Jean, Lincoln County, Nev.*, 13 poles north of mile pole 303, 32 meters west of the San Pedro, Los Angeles & Salt Lake Railroad track; set in gravel $1\frac{1}{2}$ meters below the base of the rail. (Note 52.*)

E.—At *Sutor, Lincoln County, Nev.*, $10\frac{1}{2}$ poles southwest of mile pole 306, 16 meters southeast of the San Pedro, Los Angeles & Salt Lake Railroad track, 31 meters south of the signboard; set $1\frac{1}{2}$ meters below the base of the rail. (Note 52.*)

F.—About 1.2 miles southwest of *Erie, Lincoln County, Nev.*, $1\frac{1}{2}$ poles north of mile pole 308, $17\frac{1}{2}$ meters east of the San Pedro, Los Angeles & Salt Lake Railroad track; set on a level with the base of the rail. (Note 52.*)

G.—At *Erie, Lincoln County, Nev.*, opposite the seventh pole northeast of mile pole 309, 47 meters west of the west corner of the railway depot, 16 meters northwest of the San Pedro, Los Angeles & Salt Lake Railroad track; set $\frac{1}{2}$ meter above the base of the rail. (Note 11.*)

H.—About 0.7 mile southwest of *Sloan, Lincoln County, Nev.*, $11\frac{2}{3}$ poles north of mile pole 314, in the top horizontal surface of the east end of the east concrete abutment to bridge 314 of the San Pedro, Los Angeles & Salt Lake Railroad, 2.66 meters east of the track, $\frac{1}{4}$ meter below the base of the rail. (Note 13.*)

I.—At *Sloan, Lincoln County, Nev.*, $1\frac{1}{2}$ poles east of mile pole 315, 14 meters southwest of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 19 meters southwest of the track; set $\frac{1}{2}$ meter below the base of the rail. (Note 11.*)

J.—About 2.2 miles north of *Sloan, Lincoln County, Nev.*, 4 meters northeast of the sixth pole northwest of mile pole 317 of the San Pedro, Los Angeles & Salt Lake Railroad, 15 meters northeast of the track; set 2 meters below the base of the rail. (Note 52.)

K.—At *Bard, Lincoln County, Nev.*, $4\frac{1}{2}$ meters north of the ninth pole northwest of mile pole 320, 11 meters east of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 15 meters northeast of the track; set 1 meter below the base of the rail. (Note 11.*)

L.—About 2 miles south of *Arden, Lincoln County, Nev.*, $12\frac{1}{4}$ poles south of mile pole 323 of the San Pedro, Los Angeles & Salt Lake Railroad, 17 meters east of the track; set $1\frac{1}{2}$ meters below the base of the rail. (Note 52.*)

M.—About $\frac{1}{8}$ mile north of *Arden, Lincoln County, Nev.*, $5\frac{1}{2}$ poles south of mile pole 325 of the San Pedro, Los Angeles & Salt Lake Railroad, 17 meters east of the track; set $1\frac{1}{2}$ meters below the base of the rail. (Note 2.*)

2336 B.—About 1.5 miles north of *Arden, Lincoln County, Nev.*, 1 meter east of the second pole north of mile pole 326 of the San Pedro, Los Angeles & Salt Lake Railroad, $12\frac{1}{2}$ meters east of the track; set $1\frac{1}{2}$ meters below the base of the rail; iron post stamped "B 1907, 119, 2336." (Note 17.*)

N.—At *Bracken, Lincoln County, Nev.*, $25\frac{1}{2}$ meters northwest of the signboard on the San Pedro, Los Angeles & Salt Lake Railroad, 19 meters east of the track; set 1 meter below the base of the rail. (Note 2.*)

2136 B.—About 0.7 mile north of *Bracken, Lincoln County, Nev.*, 3 meters east of mile pole 330 of the San Pedro, Los Angeles & Salt Lake Railroad, $14\frac{1}{4}$ meters east of the track; set 2 meters below the base of the rail; an iron post stamped "B 1907, 118, 2136." (Note 17.*)

O.—At *Las Vegas, Lincoln County, Nev.*, at the southeast corner of Main and Garcia Streets, 6 blocks south and 1 block east of the San Pedro, Los Angeles & Salt Lake Railroad depot, $\frac{1}{2}$ block southeast of the plant of the Las Vegas Ice & Manufacturing Co., 7 meters south of the curb on Garcia Street, $9\frac{1}{2}$ meters east of the curb on Main Street. (Note 11.*)

2024 B.—At *Las Vegas, Lincoln County, Nev.*, near the northwest corner of First and Fremont Streets, in the sidewalk at the foot of the column at the southeast corner of the First State Bank building, 1 decimeter north of the foot of the column; an aluminum tablet stamped "B 1907, 117, 2024." (Note 17.*)

P.—At *Las Vegas, Lincoln County, Nev.*, 2 blocks north and 2 blocks east of the San Pedro, Los Angeles & Salt Lake Railroad depot, at the northeast corner of Stewart and First Streets, 4 meters east of the curb on First Street, 4 meters north of the curb on Stewart Street, $\frac{1}{2}$ block north of the Arizona Club. (Note 2.*)

2033 B.—At *Las Vegas, Lincoln County, Nev.*, 46 meters west of the entrance to the ladies' waiting room of the San Pedro, Los Angeles & Salt Lake Railroad depot, 31 meters west of the main track; set $\frac{1}{2}$ meter above the base of the rail; an iron post stamped "B 1907, 116, 2033." (Note 17.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN BUTTE AND HUNTLEY, MONT., 1906.

5441 R. H. C.—At *Butte, Silver Bow County, Mont.* (For this bench mark and others at Butte see p. 198.)

G₃.—About 3 miles southeast of *Butte, Silver Bow County, Mont.*, $6\frac{1}{2}$ telegraph poles southeast of milepost B 3, in the top horizontal surface of the northeast end of the northeast coping of an arched cement culvert of the Northern Pacific Railway, about 5 meters northeast of the track, and about 2 meters below the base of the rail. (Note 4.*)

H₃.—At *Skones, Silver Bow County, Mont.*, $2\frac{1}{2}$ telegraph poles south of signboard "Skones" on the Northern Pacific Railway, $7\frac{1}{2}$ meters west of the track, 1 meter outside of the railway right of way; set in the upper horizontal surface of a large granite projection of a ledge about 1 meter above the base of the rail. (Note 13.*)

I₃.—At *Highview*, *Silver Bow County*, *Mont.*, 16 meters southwest of the fifth telegraph pole west of milepost B 10, 13 meters east of signboard "Highview" on the Northern Pacific Railway, 16 meters southeast of the track. (Note 11.*)

J₃.—At *Homestake*, *Jefferson County*, *Mont.*, 36 meters northeast of the southeast corner of the Northern Pacific Railway depot, 25 meters north of the track, 16 meters west of the west edge of the turntable and in the east edge of a wagon road. (Note 2.*)

K₃.—About 90 meters northeast of *Lewis Spur*, *Jefferson County*, *Mont.*, 36 meters north of the sixth telegraph pole west of milepost B 12 of the Northern Pacific Railway, 26 meters north of the track. (Note 11.*)

L₃.—About 2.0 miles east of *Lewis Spur*, *Jefferson County*, *Mont.*, 26 meters north of the sixth telegraph pole southwest of milepost B 14 of the Northern Pacific Railway, 16 meters north of the track; set $\frac{1}{2}$ meter above the base of the rail. (Note 2.*)

M₃.—At *Welch*, *Jefferson County*, *Mont.*, 36 meters east of the southeast corner of the Northern Pacific Railway depot, 16 meters east of a large pine tree east of the depot, 14 meters northeast of the track; set $\frac{1}{2}$ meter below the base of the rail. (Note 11.*)

N₃.—About $2\frac{1}{2}$ miles northeast of *Welch*, *Jefferson County*, *Mont.*, at a road crossing, 341 meters east of the first trestle east of Welch, 18 meters south of the Northern Pacific Railway track, in the east slope of a small hill, 5 meters northeast of a large pine; set in a ledge of granite, about on a level with the base of the rail. (Note 2.*)

O₃.—At *Spire Rock*, *Jefferson County*, *Mont.*, 25 meters northeast of the signboard, about 200 meters north of milepost B 20 of the Northern Pacific Railway, 22 meters northeast of the track; in a ledge of granite, $\frac{2}{3}$ meter above the base of the rail. (Note 11.*)

P₃.—About 2.6 miles northeast of *Pipestone*, *Jefferson County*, *Mont.*, 170 meters north of milepost B 23, 24 meters west of the Northern Pacific Railway track, at the south end of a railway cut; set on a level with the base of the rail. (Note 2.*)

Q₃.—At *Pipestone*, *Jefferson County*, *Mont.*, 19 meters southwest of the southwest corner of the Northern Pacific Railway depot, 36 meters northwest of the track, about 200 meters south of the station foreman's house; $1\frac{1}{2}$ meters above the base of the rail. (Note 11.*)

R₃.—About 3.4 miles west of *Whitehall*, *Jefferson County*, *Mont.*, 30 meters northwest of milepost B 29, 27 meters north of the Northern Pacific Railway track, and 5 meters outside of the railway right of way; set 1 meter below the base of the rail. (Note 2.*)

S₃.—At *Whitehall*, *Jefferson County*, *Mont.*, at the northeast corner of Main and Railroad Streets, at the southwest corner of the store building occupied by Clinton & Co., general merchandise, in the vertical surface of the granite foundation to the building, $\frac{1}{4}$ meter above the sidewalk; set in lead and lettered "U.S.B.M." (Note 4.*)

T₃.—At *Whitehall*, *Jefferson County*, *Mont.*, at the north end of Main Street, 3 blocks north and $\frac{1}{2}$ block west of the Northern Pacific Railway depot; originally on the public-school building (lately destroyed) on the foundation wall of the main tower, 3 meters northeast of the southeast corner of the veranda, $\frac{2}{3}$ meter above the ground; now relocated in the south foundation wall of the new school building, near the southeast corner. (Note 1.*)

U₃.—About 3.4 miles east of *Whitehall*, *Jefferson County*, *Mont.*, 4 meters east of the fifth telegraph pole west of milepost B 36, 25 meters south of the Northern Pacific Railway track, and $\frac{1}{3}$ meter outside of the right of way; set on a level with the base of the rail. (Note 2.*)

V₃.—At *Jefferson Island*, *Jefferson County*, *Mont.*, 32 meters southeast of the southeast corner of the Northern Pacific Railway station platform, 30 meters east of the northeast corner of Scheytt & Noble's general store, 7 meters east of the county road, 17 meters south of the railway track, $\frac{2}{3}$ meter inside of the railway right of way; set $\frac{2}{3}$ meter below the base of the rail. (Note 11.*)

W₃.—About 1.8 miles west of *Lime Spur*, *Jefferson County*, *Mont.*, northeast of the Jefferson River, 58 meters northeast of milepost B 42, 36 meters east of the Northern Pacific Railway track; set $1\frac{1}{3}$ meters above the base of the rail. (Note 2.*)

X₃.—At *Lime Spur*, *Jefferson County*, *Mont.*, 3 meters south of the signboard "Lime Spur," 9 meters southwest of the third telegraph pole southwest of milepost B 44 of the Northern Pacific Railway, 12 meters south of the track, and 1 meter outside of the right of way; set on a level with the base of the rail. (Note 11.*)

Y₃.—About 2.4 miles east of *Lime Spur*, *Jefferson County*, *Mont.*, 11 meters northeast of the fifth telegraph pole east of milepost B 46 of the Northern Pacific Railway, 23 meters north of the track, and 6 meters outside of the right of way; set $1\frac{1}{2}$ meters below the base of the rail. (Note 2.*)

Z₃.—About 2.7 miles west of *Sappington*, *Madison County*, *Mont.*, 24 meters west of the seventh telegraph pole northwest of mile post B 49 of the Northern Pacific Railway, 4 meters north of the track, about $\frac{2}{3}$ meter below the base of the rail; at the north end of a concrete arched culvert, in the upper horizontal surface of the coping, 0.2 meter from the west edge and 0.2 meter from the north edge. (Note 13.*)

A₄.—At *Sappington*, *Madison County*, *Mont.*, 35 meters south of the southwest corner of the Northern Pacific depot; 28 meters south of the railway track; 13 meters east of a public road; set 1 meter below the base of the rail. (Note 11.*)

B₄.—About 3.6 miles northeast of *Sappington*, *Madison County*, *Mont.*, 31 meters southeast of the third telegraph pole northeast of mile post B 55, of the Northern Pacific Railway, 17 meters southeast of the track, 2.5 meters outside of the right of way; set on a level with the base of the rail. (Note 2.*)

C₄.—At *Willow Creek*, *Gallatin County*, *Mont.*, 45 meters south of the southwest corner of the Northern Pacific Railway depot, 27 meters southeast of the track; 43 meters southwest of a public road crossing, 70 meters north of the

store and post office in the building owned by L. F. Hare, 4 meters outside of the railway right of way; set $\frac{1}{4}$ meter above the base of the rail. (Note 11.*)

D₄.—About 2.5 miles northeast of *Willow Creek, Gallatin County, Mont.*, 32 meters southwest of the eighth telegraph pole southwest of milepost B 61 $15\frac{1}{2}$ meters northwest of the Northern Pacific Railway track, $\frac{1}{2}$ meter inside of the railway right of way; set $\frac{1}{2}$ meter below the base of the rail. (Note 2.*)

E₄.—About 2 miles west of *Three Forks, Gallatin County, Mont.*, 21 meters south of the fifth telegraph pole northeast of milepost B 63, 4 meters southeast of the Northern Pacific Railway track; in the top horizontal surface of the southeast end wall of a tile culvert, 0.2 meter from the southeast side, 0.5 meter from the northeast side, 0.5 meter from the southwest end; $\frac{1}{2}$ meter below the base of the rail. (Note 16.*)

F₄.—At *Three Forks, Gallatin County, Mont.*, 22 meters north of the tenth telegraph pole northeast of milepost B 65; 34 meters south of signboard "Three Forks"; 22 meters southeast of the Northern Pacific Railway track, 15 meters southeast of the railway station platform; set on a level with the base of the rail. (Note 11.*)

I *Three Forks*.—At *Three Forks, Gallatin County, Mont.*, on the north side of Main Street; 17 meters east of State Street; at the southwest corner of the old Three Forks Hotel (now in disuse), $\frac{1}{2}$ meter inside of the fence inclosing the hotel grounds and $\frac{1}{2}$ meter from the west wall of the building. The elevation of the stone was determined and also that of a point marked by a chiseled cross in the south side of the rim of the pipe, the cap being missing from the mark. (Note 53.*)

S. B. Gallatin.—At *Old Gallatin City, Gallatin County, Mont.*, on the east side of Main Street, in an open field belonging to Frank Dunbar about 275 meters north of the southwest corner and 4 meters inside of the fence separating the field from Main Street, about 200 meters west of Moss Creek, and about 350 meters southwest of the northeast corner of section 20, T. 2 N., R. 2 E. (Note 53*, except that copper bolt is missing from cap.)

G₄.—About 0.9 mile northwest of *Old Gallatin City, Gallatin County, Mont.*, on the right bank of the Madison-Jefferson River, 25 meters east of the river and about 150 meters northwest of the west end of a row of limestone cliffs running parallel with the river, about $\frac{1}{2}$ mile upstream from the mouth of the Gallatin River and about $\frac{1}{2}$ mile southwest of "Gauge BM" (see below). (Note 53*, except that copper bolt is missing from cap.)

Gauge BM.—About $1\frac{1}{4}$ miles north of *Old Gallatin City, Gallatin County, Mont.*, on the right bank of the Madison-Jefferson River, about 500 meters south of a ranch house on the opposite side of the river, 22 meters west of the crest of a cliff and 3 meters above the river in the horizontal surface of a limestone ledge projecting into the river, about $\frac{1}{8}$ mile upstream from the mouth of the Gallatin River, 10 meters from a path leading to a skiff landing and 15 meters southwest of two cottonwood trees on the river bank. The mark is a very crude cross chiseled into the rock and lettered BM.

H₄.—About 2.3 miles west of *Logan, Gallatin County, Mont.*, 20 meters northeast of milepost HLNA 71; about 250 meters west of a private road crossing; 24 meters northeast of the Northern Pacific Railway track; $\frac{1}{2}$ meter inside of the railway right of way; set in fine loam, $\frac{3}{4}$ meter below the base of the rail. (Note 2.*)

I₄.—At *Logan, Gallatin County, Mont.*, in the center of the street south of and adjoining the Northern Pacific Railway depot; 44 meters northwest of the east corner of this street and Flower Street; 55 meters east of the southwest corner of the railway depot; set $\frac{1}{2}$ meter below the base of the rail. (Note 11.*)

J₄.—About 2.4 miles west of *Manhattan, Gallatin County, Mont.*, 4 meters south of the eleventh telegraph pole west of milepost HLNA 77; $22\frac{1}{2}$ meters south of the Northern Pacific Railway track; $\frac{1}{2}$ mile inside of the railway right of way and outside the public road; set $\frac{1}{2}$ meter below the base of the rail. (Note 2.*)

K₄.—At *Manhattan, Gallatin County, Mont.*, 36 meters west of the east corner of the Northern Pacific Railway depot; 20 meters southwest of the railway track; 57 meters east of the east corner of the building occupied by the Sanborn Co.; 48 meters northeast of the building occupied by the McLeod Mercantile Co.; 10 meters southeast of a public road; 2 meters southeast of a telegraph pole; set $\frac{1}{2}$ meter below the base of the rail. (Note 2.*)

L₄.—About 2.0 miles southeast of *Manhattan, Gallatin County, Mont.*, about 40 meters east of the twenty-first telegraph pole southeast of milepost HLNA 80, at a Northern Pacific Railway bridge with concrete abutments, in the northwest abutment; in the upper horizontal surface at the northeast end, 0.2 meter from the northeast edge; 1 meter from the southeast edge; $\frac{1}{4}$ meter below the base of the rail. (Note 5.*)

M₄.—At *Central Park, Gallatin County, Mont.*, 84 meters southeast of the Northern Pacific Railway depot; 24 meters southwest of the railway track; in the northeast foundation under the east side of the railway water tank; 1 meter southeast of the northeast corner of the frame work under the tank; set in the upper horizontal surface $1\frac{1}{2}$ meters from the east end; 0.2 meter from each of the sides lettered U. S. B. M. (Note 4.*)

N₄.—About 2.6 miles west of *Belgrade, Gallatin County, Mont.*, 8 meters southwest of the second telegraph pole west of milepost HLNA 86, of the Northern Pacific Railway, about 150 meters southwest of a farmhouse owned by W. D. Miller; 23 meters southeast of the track; 4 meters west of a private road; $\frac{1}{2}$ meter inside of the railway right of way; set about 1 meter below the base of the rail. (Note 2.*)

O₄.—At *Belgrade, Gallatin County, Mont.*, 1 block west of the Northern Pacific Railway depot; at the northeast corner of Davis Street and Northern Pacific Avenue, 94 meters north of the railway track, in the vertical surface of the foundation to the building occupied by the Belgrade State Bank, 0.5 meter east of the southwest corner, 0.5 meter above the sidewalk; a copper bolt lettered U. S. B. M. (Note 4.*)

P₄.—About 2.4 miles southeast of *Belgrade, Gallatin County, Mont.*, 43 meters northeast of the fourteenth telegraph pole southeast of milepost HLNA 90; about 300 meters west of a farmhouse owned by D. A. Gilchrist, 23 meters north

* See pp. 162-166.

of the Northern Pacific Railway track; 1 meter inside of the railway right of way; set 1 meter below the base of the rail. (Note 2.)*

Q₄.—At *Storey, Gallatin County, Mont.*, 33 meters southeast of signboard "Storey;" in the edge of the county road; about 300 meters southwest of a farmhouse; 17 meters south of the Northern Pacific Railway track, 1 meter outside of the railway right of way; set 1 meter above the base of the rail. (Note 2.)*

R₄.—At *Bozeman, Gallatin County, Mont.*, about 0.2 mile northwest of the Northern Pacific Railway depot, 16 meters north of the eighth telegraph pole northwest of the depot; about 2 meters northeast of the railway track; in the southeast concrete abutment of a railroad bridge; in the upper horizontal surface at the north corner; 0.3 meter from the northeast edge, 0.3 meter from the northwest edge about on a level with the base of the rail. (Note 5.)*

S₄.—About 1.8 miles east of *Bozeman, Gallatin County, Mont.*, 24 meters southeast of the twenty-third telegraph pole east of milepost HLNA 99; 23 meters south of the Northern Pacific Railway track and 1 meter inside of the railway right of way; set about 2½ meters below the base of the rail. (Note 2.)*

T₄.—About 1.1 miles east of *Gordon, Gallatin County, Mont.*, 11 meters southeast of the fourth telegraph pole west of milepost HLNA 104; in the Northern Pacific Railway bridge 169; in the west concrete abutment, in the upper horizontal surface, at the northwest corner, 0.2 meter from the east edge, 0.2 meter from the north edge; 0.3 meter below the base of the rail. (Note 14.)*

U₄.—At *Chestnut, Gallatin County, Mont.*, 23 meters southeast of the southwest corner of the Northern Pacific Railway depot; 45 meters southwest of milepost HLNA 106; 28 meters south of the railway track; set about 2½ meters below the base of rail. (Note 2.)*

V₄.—About 1.3 miles southwest of *West End, Gallatin County, Mont.*, 13 meters southeast of the second telegraph pole southwest of mile post HLNA 108; 24 meters southeast of the Northern Pacific Railway track; ½ meter inside of the railway right of way; set 1 meter above the base of rail. (Note 2.)*

W₄.—At *West End, Gallatin County, Mont.*, about 125 meters west of the Northern Pacific Railway depot; 48 meters south of the fifth telegraph pole east of milepost HLNA 109; 23 meters south of the railway track; 1 meter east of a public road; 1 meter outside of the railway right of way; set on a level with the base of rail. (Note 11.)*

X₄.—At *Muir, Park County, Mont.*, 16 meters southwest of the southwest corner of the Northern Pacific Railway depot, 33 meters south of the railway track, ½ meter outside the railway right of way; set 2 meters below the base of the rail. (Note 2.)*

Y₄.—About 1.4 miles west of *Hoppers, Park County, Mont.*, about 500 meters south of the Northern Pacific Railway new double tracks, 16 meters southeast of the twenty-fourth telegraph pole west of milepost HLNA 113, 5 meters east of a private road, ½ meter outside of the railroad right of way; set 1 meter below the base of the rail. (Note 2.)*

Z₄.—At *Hoppers, Park County, Mont.*, about 175 meters north of a log house owned by Tom Flynn, 54 meters north of the Northern Pacific Railway water tank, 49 meters north of the railway track, in the east edge of a public road; set about 1½ meters above the base of the rail. (Note 11.)*

A₅.—About 1.6 miles west of *Coal Spur, Park County, Mont.*, 30 meters northeast of the seventeenth telegraph pole east of milepost HLNA 116 of the Northern Pacific Railway, 4 meters north of the track in the upper horizontal surface of the north granite end of a tile culvert, 0.2 meter from the edge 1½ meters from the east edge, 1½ meters from the west edge, on a level with the base of the rail. (Note 16.)*

B₅.—About 2.0 miles east of *Coal Spur, Park County, Mont.*, about 600 meters south of the new double tracks of the Northern Pacific Railway, 23 meters northeast of milepost HLNA 120, 25 meters north of the old track, ½ meter inside of the railway right of way; set 1 meter below the base of the rail. (Note 2.)*

C₅.—At *Livingston, Park County, Mont.*, 1 block east and 1 block south of the Northern Pacific Railway depot, at the southwest corner of Main and Callendar Streets, on the south side of Callendar Street, in the stone foundation to the building occupied by the First State Bank, in the vertical surface, ½ meter west of the northwest corner of the building, ¾ meter above the walk. (Note 4.)*

D₅.—At *Livingston, Park County, Mont.*, 2 blocks east of the Northern Pacific Railway depot, on the north side of Park Street, 45 meters northeast of the southeast corner of B and Park Streets, 19 meters north of the curb on the south side of Park Street, 41 meters south of the railway track; set on a level with the base of the rail. (Note 11.)*

E₅.—About 1.2 miles west of *Africa, Park County, Mont.*, 12 meters west of the seventh telegraph pole northeast of milepost BGS 113 of the Northern Pacific Railway, 26 meters southeast of the track, ½ meter outside of the railway right of way; set on a level with the base of the rail. (Note 2.)*

F₅.—At *Africa, Park County, Mont.*, 6 meters east of the thirteenth telegraph pole east of milepost BGS 112, 15 meters southeast of signboard "Africa" on the Northern Pacific Railway, 26 meters southeast of the track, ½ meter outside of the railway right of way; set on the level with the base of the rail. (Note 11.)*

G₅.—At *Mission, Park County, Mont.*, in the north side of the county road, 13½ meters south of the Northern Pacific depot, 26 meters south of the railway track, 1 meter outside of the railway right of way; set 1 meter below the base of the rail. (Note 11.)*

H₅.—About 2.3 miles west of *Elton, Park County, Mont.*, 3 meters east of the sixth telegraph pole west of milepost BGS 104 of the Northern Pacific Railway, 19 meters south of the track, 6 meters inside of the railway right of way; set about 2 meters above the base of the rail. (Note 2.)*

* See pp. 162-166.

I₅.—At *Elton, Park County, Mont.*, 70 meters southeast of milepost BGS 102 of the Northern Pacific Railway, 17 meters south of the railroad water tank, 28 meters south of the railway track, 2 meters outside of the railway right of way; set 1 meter above the base of the rail. (Note 11.*)

J₅.—About 2.9 miles west of *Springdale, Park County, Mont.*, 10 meters north of the fifth telegraph pole north of milepost BGS 99 of the Northern Pacific Railway, at the base of a cliff, 5 meters east of the track; set on a level with the base of the rail. (Note 2.*)

K₅.—At *Springdale, Park County, Mont.*, 50 meters southeast of the southeast corner of the Northern Pacific Railway depot, 41 meters south of the railway track, 37 meters northwest of the steps to the general store owned by Jno. W. Fryor; set $\frac{1}{2}$ meter above the base of the rail. (Note 11.*)

L₅.—In *Sweet Grass County, Mont.*, about 2.4 miles east of *Springdale, Park County, Mont.*, about 50 meters north of the thirteenth telegraph pole east of milepost BGS 94 of the Northern Pacific Railway, 17 meters northwest of the track, 14 meters southeast of the right bank of the Yellowstone River; set on a level with the base of the rail. (Note 2.*)

M₅.—At *Carney, Sweet Grass County, Mont.*, 65 meters northeast of milepost BGS 91, 43 meters northeast of signboard "Carney" on the Northern Pacific Railway, 26 meters north of the track, and 1 meter outside of the railway right of way; set 1 meter below the base of the rail. (Note 2.*)

N₅.—At *Dehart, Sweet Grass County, Mont.*, 5 meters southeast of the seventh telegraph pole southwest of milepost BGS 86, about 300 meters northeast of signboard "Dehart" on the Northern Pacific Railway, 40 meters southwest of the south corner of the railway telegraph office, 25 meters southeast of the railroad track, 1 meter outside of the railway right of way; set $\frac{1}{2}$ meter below the base of the rail. (Note 11.*)

O₅.—About 2.1 miles east of *Dehart, Sweet Grass County, Mont.*, in the northwest edge of the county road, 44 meters south of milepost BGS 84 of the Northern Pacific Railway, 26 meters southeast of the track, $\frac{3}{8}$ meter outside of the railway right of way; set $\frac{3}{8}$ meter below the base of the rail. (Note 2.*)

P₅.—At *Bigtimber, Sweet Grass County, Mont.*, 44 meters northwest of the Northern Pacific Railway depot, about 125 meters northeast of mile post BGS 81, 37 meters northwest of the railway track, 24 meters northeast of a public road, 3 meters southeast of a canal; set on a level with the base of the rail. (Note 11.*)

Q₅.—About 2.4 miles east of *Bigtimber, Sweet Grass County, Mont.*, 4 meters southwest of the fifteenth telegraph pole east of milepost BGS 79 of the Northern Pacific Railway, 27 meters south of the track, $\frac{1}{2}$ meter inside the railway right of way; set $\frac{1}{2}$ meter above the base of the rail. (Note 2.*)

R₅.—About 0.6 mile east of *Reynolds, Sweet Grass County, Mont.*, in Northern Pacific Railway bridge No. 108, at the southwest end of the southeast concrete abutment, 2 meters southwest of the railway track, in the upper horizontal surface, 0.3 meter from the southwest edge, 1 meter from the southeast edge, 1 meter from the northwest edge, 0.2 meter below the base of the rail. (Note 13.*)

S₅.—About 2.2 miles west of *Greycliff, Sweet Grass County, Mont.*, 45 meters north of the eighteenth telegraph pole east of milepost BGS 73 of the Northern Pacific Railway, 25 meters north of the track, 0.2 meter outside of the railway right of way; set 2 meters below the base of the rail. (Note 2.*)

T₅.—At *Greycliff, Sweet Grass County, Mont.*, about 50 meters west of the Northern Pacific Railway depot, 41 meters southeast of the railway track on the northwest side of the county road, about 100 meters east of the building occupied by Overhulls & Co., general merchandise, 51 meters northwest of the dance hall, 15 meters outside of the railway right of way; set $\frac{1}{2}$ meter below the base of rail. (Note 11.*)

U₅.—About 1.9 miles west of *Patcum, Sweet Grass County, Mont.*, 40 meters southwest of the ninth telegraph pole west of milepost BGS 67 of the Northern Pacific Railway, about 80 meters west of the section foreman's house, 26 meters south of the track, on the north side of the county road, $\frac{1}{2}$ meter outside of the railway right of way; set $1\frac{1}{2}$ meters below the base of the rail. (Note 2.*)

V₅.—At *Patcum, Sweet Grass County, Mont.*, 10 meters south of signboard "Patcum," 16 meters southeast of the seventeenth telegraph pole east of milepost BGS 66 on the Northern Pacific Railway, 26 meters south of the track, $\frac{1}{2}$ meter inside of the railway right of way; set 1 meter above the base of rail. (Note 11.*)

W₅.—About 1.1 miles west of *Quebec, Sweet Grass County, Mont.*, 24 meters southwest of the twelfth telegraph pole west of milepost BGS 63 of the Northern Pacific Railway, 26 meters south of the track, in the west edge of a private road, $\frac{1}{2}$ meter outside of the railway right of way; set 1 meter below the base of rail. (Note 2.*)

X₅.—At *Reedpoint, Sweet Grass County, Mont.*, 17 meters south of the southwest corner of the Northern Pacific Railway depot; about 90 meters southeast of milepost BGS 57; 28 meters south of the railway track, $\frac{1}{2}$ meter outside of the railway right of way; set $1\frac{1}{2}$ meters below the base of the rail. (Note 11.*)

Y₅.—About 1.2 miles east of *Reedpoint, Sweet Grass County, Mont.*, 10 meters southeast of the ninth telegraph pole east of milepost BGS 56 on the Northern Pacific Railway, 29 meters south of the track, 20 meters east of a private road, 20 meters north of the county road, 4 meters outside of the railway right of way; set $1\frac{1}{2}$ meters below the base of rail. (Note 2.*)

Z₅.—At *Oneida, Sweet Grass County, Mont.*, 8 meters northeast of the signboard, 42 meters northeast of the thirteenth telegraph pole east of milepost BGS 54 on the Northern Pacific Railway, 24 meters northeast of the track, 1 meter outside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

A₆.—About 2.2 miles east of *Oneida, Sweet Grass County, Mont.*, 12 meters east of the eighteenth telegraph pole east of milepost BGS 52, about 100 meters northeast of Northern Pacific Railway bridge No. 78, about 100 meters west of a

private road crossing, 25 meters southeast of the railway track, $\frac{1}{2}$ meter outside of the railway right of way; set $\frac{1}{2}$ meter below the base of the rail. (Note 2.*)

B₆.—At *Merrill, Sweet Grass County, Mont.*, 11 meters south of the Northern Pacific Railway depot, 50 meters northwest of the house owned by Miller Bros., 25 meters south of the railway track; set $\frac{2}{3}$ meter below the base of rail. (Note 11.*)

C₆.—About 1.2 miles east of *Merrill, Sweet Grass County, Mont.*, 4 meters northwest of the fourteenth telegraph pole east of milepost BGS 48 on the Northern Pacific Railway, 10 meters southwest of the track, $\frac{1}{2}$ meter outside of the railway right of way; set 1 meter below the base of rail. (Note 2.*)

D₆.—At *Wataga, Sweet Grass County, Mont.*, 16 meters south of the signboard, 11 meters southwest of the sixth telegraph pole west of milepost BGS 45 of the Northern Pacific Railway, 26 meters south of the track, 1 meter inside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

E₆.—In *Yellowstone County, Mont.*, about 2.5 miles east of *Wataga, Sweet Grass County, Mont.*, 28 meters southwest of the ninth telegraph pole east of milepost BGS 43 on the Northern Pacific Railway, 26 meters south of the track, $\frac{1}{2}$ meter inside of the railway right of way; set 1 meter below the base of rail. (Note 2.*)

F₆.—At *Columbus, Yellowstone County, Mont.*, $1\frac{1}{2}$ blocks west and 1 block north of the Northern Pacific Railway depot, on the north side of the second street north of the railway track, in the vertical stone surface of the public-school building at the left on entering, 0.3 meter west of the entrance, 1 meter above the lower stone step. (Note 1.*)

G₆.—At *Columbus, Yellowstone County, Mont.*, about 50 meters northeast of the Northern Pacific Railway depot, 40 meters north of the railway track, at the northeast corner of Second Street and Pike Avenue, 3 meters west of the building occupied by Frazer & Rothwell, general merchandise; set on a level with the sidewalk. (Note 11.*)

H₆.—About 2.2 miles east of *Columbus, Yellowstone County, Mont.*, 60 meters east of milepost BGS 38 on the Northern Pacific Railway, 26 meters northeast of the track, $\frac{1}{2}$ meter outside of the railway right of way; set 2 meters below the base of rail. (Note 2.*)

I₆.—At *Misko, Yellowstone County, Mont.*, 11 meters southwest of the fourth telegraph pole east of signboard "Misko," 11 meters southwest of the eighteenth telegraph pole east of milepost BGS 35 on the Northern Pacific Railway, 26 meters south of the track, $\frac{1}{2}$ meter inside of the right of way; set on a level with the base of rail. (Note 11.*)

J₆.—About 1.3 miles west of *Rapids, Yellowstone County, Mont.*, 12 meters southwest of the ninth telegraph pole west of milepost BGS 33 on the Northern Pacific Railway, 26 meters south of the track, $\frac{1}{2}$ meter inside of the railway right of way; set 2 meters below the base of rail. (Note 2.*)

K₆.—At *Rapids, Yellowstone County, Mont.*, about 75 meters southwest of the signboard, 80 meters southwest of milepost BGS 32 on the Northern Pacific Railway, 26 meters south of the track, $\frac{1}{2}$ meter inside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

L₆.—About 2.3 miles east of *Rapids, Yellowstone County, Mont.*, 4 meters southeast of the eleventh telegraph pole east of milepost BGS 30 on the Northern Pacific Railway, 26 meters southeast of the track, $\frac{1}{2}$ meter inside of the railway right of way; set 1 meter above the base of rail. (Note 2.*)

M₆.—At *Youngs Point, Yellowstone County, Mont.*, 50 meters southeast of signboard "Youngs Point," 3 meters south of the seventh telegraph pole west of milepost BGS 27 on the Northern Pacific Railway, 26 meters southwest of the track, $\frac{3}{4}$ meter inside of the railway right of way; set on a level with the base of rail. (Note 11.*)

N₆.—About 2.2 miles west of *Park City, Yellowstone County, Mont.*, 2 meters west of the sixth telegraph pole east of milepost BGS 25 on the Northern Pacific Railway, 19 meters southeast of the track; set 1 meter below the base of rail. (Note 2.*)

O₆.—At *Park City, Yellowstone County, Mont.*, 40 meters southeast of the Northern Pacific Railway depot, 26 meters northeast of a street leading through the city and across the railway track, about 75 meters northwest of the Sieber Hotel, 61 meters southeast of the railway track; set $\frac{1}{2}$ meter below the base of rail. (Note 11.*)

P₆.—About 2.1 miles east of *Park City, Yellowstone County, Mont.*, 2 meters northwest of the fifteenth telegraph pole east of milepost BGS 21 on the Northern Pacific Railway, 19 meters southeast of the track; set 1 meter below the base of rail. (Note 2.*)

Q₆.—About 2.5 miles west of *Laurel, Yellowstone County, Mont.*, 34 meters west of the third telegraph pole west of milepost BGS 18 of the Northern Pacific Railway, 24 meters southeast of the track, $\frac{1}{2}$ meter inside of the railway right of way; set 1 meter below the base of rail. (Note 11.*)

R₆.—At *Laurel, Yellowstone County, Mont.*, about 75 meters west of the Northern Pacific Railway depot, 70 meters northwest of the railway track, at the east corner of Main Street and Third Avenue, 30 meters southeast of the building occupied by the Westbrook Mercantile Co. (general supply store), 40 meters east of the First National Bank; set $\frac{1}{2}$ meter below the base of rail. (Note 11.*)

S₆.—About 2.4 miles east of *Laurel, Yellowstone County, Mont.*, 3 meters southwest of the sixth telegraph pole east of milepost BGS 13 on the Northern Pacific Railway, 20 meters southeast of the track; set $\frac{1}{2}$ meter below the base of rail. (Note 2.*)

T₆.—At *Foster, Yellowstone County, Mont.*, $1\frac{1}{2}$ meters east of signboard "Foster," 16 meters northwest of the thirteenth telegraph pole east of milepost BGS 9 on the Northern Pacific Railway, 14 meters southeast of the track, 40 meters inside of the railway right of way; set $\frac{1}{2}$ meter below the base of rail. (Note 11.*)

*See pp. 162-166.

U₆.—About 2.3 miles west of *Yegen, Yellowstone County, Mont.*, 27 meters east of the fifteenth telegraph pole east of milepost BGS 6 on the Northern Pacific Railway, 75 meters northwest and across the county road from the ranch house owned by John Summers, about 300 meters east of the ranch house on the northwest side of the county road and just west of the Summers ranch, 50 meters southwest of a public road crossing, 40 meters southeast of railway bridge No. 2, 32 meters southeast of the railway track, $\frac{1}{2}$ meter inside of the railway right of way; set on a level with the base of rail. (Note 52.*)

V₆.—At *Yegen, Yellowstone County, Mont.*, about 75 meters northeast of the Northern Pacific Railway depot, 14 meters south of the fourth telegraph pole west of milepost BGS 4, 36 meters southeast of the railway track, $\frac{1}{2}$ meter inside of the railway right of way; set $\frac{1}{2}$ meter below the base of rail. (Note 11.*)

W₆.—About 2.0 miles west of *Billings, Yellowstone County, Mont.*, 26 meters southeast of milepost BGS 2 on the Northern Pacific Railway, 24 meters southeast of the track, 1 meter northwest of the county road and 1 meter inside of the railway right of way; set $\frac{1}{2}$ meter below the base of rail. (Note 2.*)

X₆.—At *Billings, Yellowstone County, Mont.*, 1 block west of the Northern Pacific Railway passenger depot, at the southwest corner of Montana Avenue and Twenty-ninth Street, 50 meters southwest of the Thornton Hotel, 47 meters north of the railway track, 45 meters west of the Parmley Public Library in a vacant lot just inside the board sidewalks; set 0.1 meter above the level of the walks. (Note 11.*)

Y₆.—At *Billings, Yellowstone County, Mont.*, 1 block west and 4 blocks north of the Northern Pacific Railway passenger depot, at the northwest corner of Twenty-ninth Street and Fourth Avenue, on the Billings High-School grounds, 10 meters southeast of the southeast corner of the main high-school building, 0.2 meter west of the walk on Twenty-ninth Street, 0.2 meter north of the walk on Fourth Avenue, 0.2 meter above the level of the walk. (Note 2.*)

Z₆.—At *Billings, Yellowstone County, Mont.*, 2 blocks north and 1 block east of the Northern Pacific Railway passenger depot, on the north side of Second Avenue, in the vertical stone surface of the county courthouse, at the right of and 2.8 meters east of the south entrance, 0.2 meter above the ground. (Note 1.*)

A₇.—At *Billings, Yellowstone County, Mont.*, 3 blocks east of the Northern Pacific Railway passenger depot, on the north side of Montana Avenue, in the vertical stone surface of the main building of the Billings Brewing Co., 0.31 meter east from the southwest corner of the building, 0.53 meter above the ground. (Note 4.*)

B₇.—About 1.9 miles east of *Billings, Yellowstone County, Mont.*, in the northwest granite abutment of Northern Pacific Railway bridge No. 565, in the upper horizontal surface, $2\frac{1}{2}$ meters northeast of the railway track, 0.3 meter from the southeast edge, 0.3 meter from the northwest edge, 0.2 meter below the base of the rail. (Note 16.*)

C₇.—About 2.2 miles west of *Lockwood, Yellowstone County, Mont.*, 70 meters south of the twelfth telegraph pole west of milepost G 221 of the Northern Pacific Railway, 70 meters southeast of the track, $\frac{1}{2}$ meter inside of the railway right of way; set on a level with the base of rail. (Note 2.*)

D₇.—About 1.9 miles east of *Lockwood, Yellowstone County, Mont.*, 17 meters north of milepost G 217, 75 meters northeast of Northern Pacific Railway bridge No. 550, 14 meters northwest of the railway track, 15 meters southeast of the right bank of the Yellowstone River; set on a level with the base of rail. (Note 2.*)

U.S.R.S. 1.—About 2.8 miles west of *Huntley, Yellowstone County, Mont.*, at Huntley head gates, 12 meters east of the sixth pole east of milepost G 116 of the Northern Pacific Railway, 12 meters north of the track, in the top horizontal concrete surface of the head gate, 3 meters from the southwest edge, 3 meters from the northeast edge, $2\frac{1}{2}$ meters below the base of the rail. (Note 54.*)

U.S.R.S. 2.—About 2.2 miles west of *Huntley, Yellowstone County, Mont.*, 30 meters southeast of the fifth telegraph pole west of milepost G 215 of the Northern Pacific Railway, 21 meters south of the track, at the concrete portal at the west end of tunnel No. 2, in the center of the top horizontal surface, 1 meter below the base of rail. (Note 54.*)

U.S.R.S. 3.—About 1.2 miles west of *Huntley, Yellowstone County, Mont.*, 90 meters southwest of milepost G 214 of the Northern Pacific Railway, 7 meters southeast of the track, in the center of the top horizontal concrete surface of the spillway, on a level with the base of rail. (Note 54.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN LAS VEGAS, NEV., AND ZENDA, UTAH, 1908.

2033 B.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

O.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

2024 B.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

P.—At *Las Vegas, Lincoln County, Nev.* (See p. 204.)

Q.—At *Stewart, Lincoln County, Nev.*, about 225 meters northeast of signboard "Stewart" on the San Pedro, Los Angeles & Salt Lake Railroad, 17 paces southeast of the east rail of the main track, 4 telegraph poles southwest of mile pole 339 and 21 paces southwest of section house; set in the fence corner outside of the right of way, 2.5 feet from the north fence and 3 feet from the east fence. (Note 11.*)

R.—About 0.6 mile southwest of *Valley, Lincoln County, Nev.*, 5 telegraph poles southwest of mile pole 341, 19.7 feet southeast of east rail of main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 2.8 feet from north bulkhead (produced) of bridge 341B. This bench mark is on a large porphyry block used in the riprap work on the southeast side of the bridge, the block being at the northeast end of the bridge opening. (Note 5.*)

S.—At *Valley, Lincoln County, Nev.*, 125 feet northwest of the west rail of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Valley." (Note 11.*)

T.—About 2.5 miles northeast of *Valley, Lincoln County, Nev.*, 110 meters northeast of the center of bridge 344C and directly opposite mile pole 345, 20.8 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 6.6 meters northwest of mile pole 345. (Note 2.)*

U.—At *Dike, Lincoln County, Nev.*, about 300 meters east of signboard "Dike," 5 telegraph poles east of mile pole 347, 218 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 44 paces west of the west face of the section house and in line with the back wall produced. (Note 11.)*

V.—About 3.0 miles northeast of *Dike, Lincoln County, Nev.*, 40 meters southwest of mile pole 350 and 250 meters southwest of bridge 350A, 11.7 meters northwest of the west rail of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 5.8 meters above it, 1.5 meters southeast of the line between mile pole 350 and first telegraph pole south of it, set vertically in rock outcrop. (Note 4.)*

W.—At *Apex, Lincoln County, Nev.*, about 400 meters southwest of signboard "Apex," at highest point of railroad grade between Las Vegas and Moapa, 4.8 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 10 meters southwest of the southwest end of the Apex siding; set horizontally in solid rock cut 1.2 meters above the top of the rail. (Note 4.)*

X.—About 2.4 miles northeast of *Apex, Lincoln County, Nev.*, 0.4 miles northeast of mile pole 354, 28 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the south wing wall of concrete culvert 354A, 0.9 meter above the apron of the culvert. (Note 4.)*

Y.—At *Garnet, Lincoln County, Nev.*, at the southwest end of the Garnet siding, 10 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set horizontally at the northeast corner of the concrete section house, facing the tracks and 1.5 meters above the ground. (Note 4.)*

Z.—At *Garnet, Lincoln County, Nev.*, directly beneath bench mark Y on the projecting concrete foundation of the section house at the northeast corner. (Note 5.)*

A₁.—About 3.0 miles south of *Dry Lake, Lincoln County, Nev.*, 136 feet east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, just south of mile pole 360 and bridge 359B; set in lower end of the embankment for protecting the railroad track from wash and projecting 1 foot above the ground. (Note 2.)*

B₁.—At *Dry Lake, Lincoln County, Nev.*, on the steel base of the southwest one of the two water-tank supports nearest the main track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 13.)* In addition, the letters "U.S.B.M." were cut in the face of the concrete supporting pier.

C₁.—At *Dry Lake, Lincoln County, Nev.*, about 16 meters southwest of the south wall of and on the opposite side of the track from the telegraph station at Dry Lake, 16.8 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set in hard gypsum soil, projecting 1 foot above the ground. (Note 2.)*

D₁.—About 2.0 miles northeast of *Dry Lake, Lincoln County, Nev.*, 4½ telegraph poles south of mile pole 365, and 60.4 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set on a small knoll and projecting 1 foot above the ground. (Note 2.)*

E₁.—At *Crystal, Lincoln County, Nev.*, 15 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set in the vertical wall of the concrete section house at southwest corner on side facing the tracks, at northeast end of Crystal siding and 0.1 meters above the ground. (Note 1.)*

F₁.—At *Ute, Lincoln County, Nev.*, 65 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad directly opposite signboard "Ute"; set in the dirt embankment for wash protection and projecting 1 foot above the ground. (Note 2.)*

G₁.—At *Byron, Lincoln County, Nev.*, 15 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set in the vertical wall of the concrete section house at southwest corner on side facing the tracks, 1.4 meters above the ground. (Note 1.)*

H₁.—About 1.2 miles southwest of *Moapa, Lincoln County, Nev.*, on the San Pedro, Los Angeles & Salt Lake Railroad, 35 meters southwest of the signboard "Moapa one mile," at the south corner of the top surface of the southeast parapet wall of culvert 381B, northeast of the main bridge over Muddy Creek, and about in the middle of the high fill across Muddy Valley, letters "U.S.B.M." cut in the vertical face of the wall directly beneath the bench mark. (Note 4.)*

I₁.—At *Moapa, Lincoln County, Nev.*, in front of the Muddy Valley store and hotel, on the west side of the San Pedro, Los Angeles & Salt Lake Railroad, and distant about 160 meters from the main track; set near the fence line at the northeast corner of the hotel and projecting 5 inches above the ground. (Note 2.)*

J₁.—At *Moapa, Lincoln County, Nev.*, set in the vertical concrete foundation wall of the San Pedro, Los Angeles & Salt Lake Railroad station at the northwest corner of the building, facing Railroad Avenue, about 0.5 meters above the ground. (Note 1.)*

K₁.—At *Moapa, Lincoln County, Nev.*, on the east side of the San Pedro, Los Angeles & Salt Lake Railroad tracks; set close to the porch, in front of the store of W. C. Bowman, at the northeast corner of Moapa Avenue and Railroad Avenue. (Note 2.)*

L₁.—At *Moapa, Lincoln County, Nev.*, about 640 meters north of the San Pedro, Los Angeles & Salt Lake Railroad station, in the southerly one of the two concrete piers of the water tank facing the railroad tracks on the west side of the tracks; set horizontally with letters "U.S.B.M." cut in the face of the concrete pier. (Note 4.)*

M₁.—At *Acton, Lincoln County, Nev.*, at the south end of the Acton siding, 20 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set horizontally in the vertical wall of the concrete sec-

tion dwelling midway between the 2 doors facing the tracks and 1.5 meters above the ground. The section dwelling is the southerly one of the two concrete buildings at Acton. (Note 4.*)

N₁.—At *Guelph, Lincoln County, Nev.*, about 60 feet north of signboard "Guelph," 170 feet south of the center of bridge 392C and 2½ telegraph poles south of mile pole 393, 32 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad and 1 meter outside the right-of-way fence line. (Note 2.*)

O₁.—About 2.8 miles south of *Rox, Lincoln County, Nev.*, 470 meters north of Huntsman's Ranch at the entrance to the Meadow Valley Canyon, 15 meters north of first road crossing north of the entrance, 3.5 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, in the northeast corner of concrete culvert 394C, set vertically. (Note 4.*)

P₁.—At *Rox, Lincoln County, Nev.*, 15 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the side of the concrete telegraph office toward the tracks, 1.5 meters above the ground and 0.5 meter above the top of the rail. (Note 1.*)

Q₁.—At *Rox, Lincoln County, Nev.*, 52 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad set vertically in the northwest corner of the concrete support of the water tank, 8 meters above the railroad track on rocky ledge. (Note 4.*)

R₁.—At *Hoya, Lincoln County, Nev.*, 32 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad directly opposite signboard "Hoya," 0.5 meter outside the right-of-way fence, set on opposite side of tracks from bed of the Meadow Valley wash. (Note 11.*)

S₁.—At *Galt, Lincoln County, Nev.*, 15 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, at the west end of the Galt siding in the side of the concrete section house facing the tracks, 1.5 meters above the ground and 1.7 meters above the top of the rail. (Note 1.*)

T₁.—About 3.5 miles north of *Galt, Lincoln County, Nev.*, on west end of southwest concrete abutment of bridge 411A of the San Pedro, Los Angeles & Salt Lake Railroad, 3.5 meters northwest of the center line and 0.5 meter below the top of the rail; set vertically. (Note 4.*)

U₁.—At *Vigo, Lincoln County, Nev.*—36.2 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Vigo;" 5.5 meters outside of the right-of-way fence, and 0.2 meter below the top of the rail. (Note 2.*)

V₁.—About 0.5 miles north of *Vigo, Lincoln County, Nev.*, on south end of west concrete abutment of bridge 413A of the San Pedro, Los Angeles & Salt Lake Railroad in the entrance to the canyon north of Vigo, 3.5 meters south of the center line and 0.5 meter below the top of the rail; set vertically. (Note 4.*)

W₁.—About 2.0 miles south of *Carp, Lincoln County, Nev.*, 35.0 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on southeast side of highway, 25 meters south of mile pole 416 and 1.1 meters below the top of the rail; set at base of a rocky point. (Note 2.*)

X₁.—At *Carp, Lincoln County, Nev.*, 15 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the concrete section house facing the tracks, 50 meters southwest of the telegraph station at Carp, and 1.6 meters above the ground. (Note 1.*)

Y₁.—At *Carp, Lincoln County, Nev.*, 70 meters northeast of the telegraph station at Carp and 20 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, in the northeast radial plane of the circular stone wall of the pump well, 0.5 meter above the ground; set horizontally. (Note 4.*)

Z₁.—At *Carp, Lincoln County, Nev.*, 500 meters northeast of the telegraph station at Carp, 25 meters southwest of the point of switch at north end of Carp siding and 48 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 0.6 meter above the top of the rail and 17 meters outside of the right-of-way fence; set at foot of rocky point. (Note 11.*)

A₂.—At *St. George, Lincoln County, Nev.*, 126.0 meters south of the signboard "St. George," 138.8 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 107.6 meters west of the right-of-way fence, and 1 meter above the top of the rail opposite the bench mark; set at foot of cliff above broad sandy wash. (Note 11.*)

B₂.—At *Leith, Lincoln County, Nev.*, 15 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad on the side of the concrete section house facing the tracks, 430 meters north of the signboard "Leith" and 1.6 meters above the ground. (Note 1.*)

C₂.—About 1.3 miles north of *Leith, Lincoln County, Nev.*, set vertically on the southwest end of the southeast concrete abutment of bridge 429B of the San Pedro, Los Angeles & Salt Lake Railroad, 100 meters northwest of signboard "Leith one mile," 3.8 meters southwest of the center line and 2.0 meters below the top of the rail. (Note 4.*)

D₂.—About 3.9 miles north of *Leith, Lincoln County, Nev.*, set vertically in the southwest end of the southeast concrete abutment of bridge 431G of the San Pedro, Los Angeles & Salt Lake Railroad, 3.4 meters southwest of the center line and 0.5 meter below the top of the rail. (Note 4.*)

E₂.—At *Kyle, Lincoln County, Nev.*, 28 meters northeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Kyle," on east side of highway which crosses tracks at this point and 1.1 meters above the top of the rail. (Note 11.*)

F₂.—About 1.4 miles north of *Kyle, Lincoln County, Nev.*, set vertically in the northeast concrete wall of culvert 434A of the San Pedro, Los Angeles & Salt Lake Railroad, 7.2 meters northeast of the center line and 2.5 meters below the top of the rail. (Note 4.*)

* See pp. 162-166.

G₂.—At *Elgin, Lincoln County, Nev.*, 0.3 mile south of the telegraph station at Elgin, directly opposite mile pole 438, 22 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 2.5 meters east of the right-of-way fence line near the foot of the cliffs. (Note 11.*)

H₂.—At *Elgin, Lincoln County, Nev.*, 135 meters north of the telegraph station at Elgin, 11 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the side of the concrete section house facing the tracks, and 1.6 meters above the ground. (Note 1.*)

I₂.—At *Elgin, Lincoln County, Nev.*, 4.9 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the steel base of the west one of the three southerly tank columns and letters "U. S. B. M." cut in the face of the concrete pier. (Note 13.*)

J₂.—At *Boyd, Lincoln County, Nev.*, 420 meters southeast of the station sign "Boyd," 75 meters northwest of the point of switch at the south end of Boyd siding, 18.2 meters northeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 2.5 meters northeast of the right-of-way fence and in line with the north fence at the highway crossing. (Note 2.*)

K₂.—About 3.9 miles north of *Boyd, Lincoln County, Nev.*, set vertically in the east wing wall of the north concrete abutment of bridge 446A of the San Pedro, Los Angeles & Salt Lake Railroad, 3.0 meters east of the center line and 3.8 meters north of the south face of the abutment, opposite Carson's ranch. (Note 4.*)

L₂.—At *Stine, Lincoln County, Nev.*, 125 meters north of the signboard "Stine," 27 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 1.9 meters outside the right-of-way fence, and 2.2 meters north of angle in fence line, 14 meters above the top of the rail; set at the foot of the white cliffs opposite the power plant of the Delamar mine. (Note 11.*)

M₂.—At *Cana, Lincoln County, Nev.*, 0.8 mile north of the signboard "Stine," 15 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad in the face of the concrete section house facing the track, 1.5 meters above the ground. (Note 1.*)

N₂.—About 3.2 miles north of *Stine, Lincoln County, Nev.*, on the southeast concrete wall of culvert 450D of the San Pedro, Los Angeles & Salt Lake Railroad, 4.1 meters southeast of the center line and 1.0 meter below the top of the rail. (Note 4.*)

O₂.—At *Etna, Lincoln County, Nev.*, 155 meters southeast of the center of bridge 453A, 340 meters southwest of the point of switch at the northeast end of the Etna siding, 48 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 17.5 meters outside the right-of-way fence; set with top 0.4 meter below the top of the rail. (Note 11.*)

P₂.—At *Caliente, Lincoln County, Nev.*, 11.5 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the concrete foundation of the railroad station, facing the tracks and directly beneath the agent's office, 0.3 meter above the ground. (Note 1.*)

Q₂.—At *Caliente, Lincoln County, Nev.*, at the corner of Culverwell Avenue and Market Street, on the face of the public-school building toward Culverwell Avenue, 1.8 meters above the ground. (Note 1.*)

R₂.—At *Caliente, Lincoln County, Nev.*, on the west side of South Spring Street, 294 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 36 meters west of the line (produced) of the west faces of the "Company row" houses on North Spring Street; set at foot of wash from hill, 15 meters above the railroad track. (Note 11.*)

S₂.—At *Caliente, Lincoln County, Nev.*, 50 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the Caliente Mercantile Co.'s store on Clover Street, 1.5 meters above the ground. (Note 1.*)

T₂.—At *Caliente, Lincoln County, Nev.*, 45 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, in the face of the concrete section house facing the tracks, 1.6 meters above the ground. (Note 1.*)

U₂.—At *Eccles, Lincoln County, Nev.*, 41 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 220 meters west of the east end of Eccles siding; set in a small niche in the high cliffs, 1.1 meters above the top of the rail. (Note 2.*)

V₂.—About 2.0 miles northwest of *Minto, Lincoln County, Nev.*, 3.5 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the east end of the south concrete abutment of bridge 465B; set 0.5 meter below the top of the rail. (Note 4.*)

W₂.—At *Minto, Lincoln County, Nev.*, 30.3 meters southwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 30.5 meters from the signboard "Minto"; set near the foot of the cliffs, 0.2 meter above the top of the rail. (Note 11.*)

X₂.—At *Big Springs, Lincoln County, Nev.*, 6.3 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 45 meters south of the section house on the west wall of stone culvert 470E; set vertically, 2.2 meters below the top of the rail. (Note 1.*)

Y₂.—At *Islen, Lincoln County, Nev.*, 200 meters west of signboard "Islen," and 21.1 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set at the foot of high white cliffs, 1.0 meter above the top of the rail. (Note 2.*)

Z₂.—At *Barclay, Lincoln County, Nev.*, 0.7 mile east of signboard "Barclay," and 15 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set directly in front of the fence at Wood's ranch (Barclay post office), facing the highway, 0.3 meter below the top of the rail. (Note 11.*)

A₃.—At *Acoma, Lincoln County, Nev.*, 65 meters southwest of the San Pedro, Los Angeles & Salt Lake Railroad station at Acoma, and 10.4 meters northwest of the center line of the main track, 0.2 meter below the top of the rail. (Note 2.)*

B₃.—At *Acoma, Lincoln County, Nev.*, 50 meters northeast of the San Pedro, Los Angeles & Salt Lake Railroad station at Acoma, and 3.9 meters northwest of the center line of the main track; set in the southwest end of the concrete pier of the water tank nearest the main track. (Note 4.)*

C₃.—At *Acoma, Lincoln County, Nev.*, 25 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the concrete bunk house toward the tracks, 0.7 meter above the top of the rail. (Note 1.)*

D₃.—About 1.8 miles northeast of *Acoma, Lincoln County, Nev.*, 5.8 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the south wall of stone culvert 483B, 2.0 meters below the top of the rail. (Note 5.)*

E₃.—At *Brown, Lincoln County, Nev.*, 19 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Brown," 1.0 meter above the top of the rail. (Note 11.)*

F₃.—At *Crestline, Lincoln County, Nev.*, 29 meters west of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the face of the concrete bunk house facing the tracks, 1.6 meters above the ground. (Note 1.)*

G₃.—At *Crestline, Lincoln County, Nev.*, 23 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 5 meters north (measured along the tracks) of signboard "Crestline," 0.9 meter above the top of the rail. (Note 11.)*

H₃.—At *Lien, Lincoln County, Nev.*, 19 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Lien," 0.8 meter above the top of the rail. (Note 2.)*

A₈.—At *Uvada, Iron County, Utah*, 30 meters southwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Uvada," 0.5 meter below the top of the rail. (Note 11.)*

B₈.—At *Tomas, Iron County, Utah*, 38 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 23 meters southeast of signboard "Tomas," (measured along the track); set at foot of low rocky ridge, 1.2 meters below the top of the rail. (Note 2.)*

C₈.—About 2.9 miles southwest of *Modena, Iron County, Utah*, 46 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 75 meters northeast of the center of bridge 504A (measured along the track) and 0.6 meter above the top of the rail; set vertically in the top of a large boulder lying at the foot of the first rocky point northeast of Tomas siding. (Note 4.)*

D₈.—At *Modena, Iron County, Utah*, 33.2 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad in the yard of the United States Weather Bureau Station, 29 meters north of the north face of the Bureau building and 5 meters north of the flagstaff, 2.1 meters below the top of the rail. (Note 2.)*

E₈.—At *Modena, Iron County, Utah*, 7.1 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the east one of the two concrete piers of the water tank, which are connected with concrete intake; set vertically in cement. (Note 4.)*

F₈.—At *Modena, Iron County, Utah*, 51.2 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad and 39 meters south of the south side of the railroad station; 0.9 meter below the top of the rail; set on the south side of highway and projecting 8 inches above the top of the ground. (Note 11.)*

G₈.—At *Modena, Iron County, Utah*, 30 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad on the side of the concrete bunk house toward the track, 1.6 meters above the ground. (Note 1.)*

H₈.—At *Escalante, Iron County, Utah*, 63 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Escalante," 0.6 meter below the top of the rail. (Note 2.)*

I₈.—About 2.4 miles west of *Morton, Iron County, Utah*, 0.8 mile west of mile pole 517, 33 meters south of the center line of the San Pedro, Los Angeles & Salt Lake Railroad, set 1.1 meters below the top of the rail. (Note 2.)*

J₈.—At *Morton, Iron County, Utah*, 26 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Morton," 0.8 meter below the top of the rail. (Note 11.)*

K₈.—At *Beryl, Iron County, Utah*, 47 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Beryl," set 1.3 meters below the top of the rail. (Note 2.)*

L₈.—At *Beryl, Iron County, Utah*, 5 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 520 meters east of signboard "Beryl," on the steel base of the north one of the three westerly water-tank columns. (Note 13.)*

M₈.—At *Beryl, Iron County, Utah*, 20 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 520 meters east of signboard "Beryl;" set vertically in the northwest concrete pier of the wind-mill tower, opposite water tank, 1.5 meters below the top of the rail. (Note 1.)*

N₈.—At *Sahara, Iron County, Utah*, 22 meters north of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the side of the concrete section house facing the tracks, 0.9 meter above the top of the rail and 1.8 meters above the ground. (Note 1.)*

O₈.—At *Sahara, Iron County, Utah*, 53 meters south of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Sahara," 1.4 meters below the top of the rail. (Note 11.)*

P₈.—At *Ford, Iron County, Utah*, 34 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Ford," 1.4 meters below the top of the rail. (Note 2.)*

Q₈.—At *Lund, Iron County, Utah*, 6.6 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the steel base of the middle one of the three westerly water-tank columns. (Note 13.)*

R₈.—At *Lund, Iron County, Utah*, 20 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, set vertically in the west concrete pier of the windmill tower opposite water tank, 0.2 meter below the top of the rail. (Note 1.)*

S₈.—At *Lund, Iron County, Utah*, 62 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite operator's office in railroad station and in line with two white posts lettered "R. R. Property," 0.8 meter below the top of the rail. (Note 11.)*

5092 R *Lund*.—At *Lund, Iron County, Utah*, 29 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 74 meters northeast of the operator's office in the railroad station; set in the southwest angle of the large Y, 0.7 meter below the top of the rail. (Note 18.)*

T₈.—At *Kerr, Iron County, Utah*, 48.5 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Kerr," and 1.0 meter below the top of the rail. (Note 2.)*

U₈.—At *Latimer, Iron County, Utah*, 30 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railway, opposite signboard "Latimer," and in line of telegraph poles, 1.2 meters below the top of the rail. (Note 11.)*

V₈.—About 0.9 mile southwest of *Nada, Iron County, Utah*, 5.5 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the northwest wall of concrete culvert 551A, 1.3 meters below the top of the rail. (Note 4.)*

W₈.—At *Nada, Iron County, Utah*, 22 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Nada," on side of concrete section house facing the tracks, 1.5 meters above the ground. (Note 1.)*

X₈.—About 2.7 miles southwest of *Thermo, Beaver County, Utah*, 5.5 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the southeast wall of concrete culvert 556B, 1.7 meters below the top of the rail. (Note 4.)*

Y₈.—At *Thermo, Beaver County, Utah*, 41 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Thermo" and section house, 1.7 meters below the top of the rail. (Note 11.)*

Z₈.—At *Thermo, Beaver County, Utah*, 6.5 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, on the middle one of the three southwesterly water-tank columns, at northeast end of Thermo siding. (Note 13.)*

A₉.—At *Thermo, Beaver County, Utah*, 25 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set vertically in the east concrete pier of the windmill tower, directly opposite the water tank at the northeast end of Thermo siding, 1.4 meters below the top of the rail. (Note 1.)*

B₉.—At *Laho, Beaver County, Utah*, 44.2 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad; set directly opposite signboard "Laho," 1.4 meters below the top of the rail. (Note 2.)*

C₉.—At *Upton, Beaver County, Utah*, 30 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 50 meters northeast (measured along the tracks) of signboard "Upton," in line with telegraph poles, 1.2 meters below the top of the rail. (Note 2.)*

D₉.—About 2.7 miles southwest of *Milford, Beaver County, Utah*, 30 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 0.7 mile southwest of the Majestic Smelter, and 0.4 mile southwest of mile pole 572; set near private road crossing of Martin ranch, 1.0 meter below the top of the rail. (Note 2.)*

E₉.—At *Milford, Beaver County, Utah*, 0.3 mile southwest of the San Pedro, Los Angeles & Salt Lake Railroad station, 51.5 meters northwest of the center line of the main track, on the wall of the most southerly concrete section house, 1.6 meters above the ground. (Note 1.)*

F₉.—At *Milford, Beaver County, Utah*, 0.3 mile southwest of San Pedro, Los Angeles & Salt Lake Railroad station, 43.6 meters southeast of the center line of the main track, set vertically in the northerly one of the concrete bases supporting the coal-chute trestles, 0.6 meter above the top of the rail. (Note 1.)*

G₉.—At *Milford, Beaver County, Utah*, 113 meters southeast of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 145 meters southwest (measured along the tracks) of operator's office in railroad station and 24 meters northeast of the center of highway from Milford to Minersville, 0.6 meter below the top of the rail. (Note 11.)*

5084 FRR.—At *Milford, Beaver County, Utah*, 117 meters northeast of operator's office in railroad station, 8.0 meters northwest of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, and 0.5 meter below the top of the rail. (Note 18.)*

H₉.—At *Opal, Beaver County, Utah*, 20 meters west of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, directly opposite signboard "Opal," and section pole; set 0.2 meter above the top of the rail. (Note 2.)*

I₉.—Near *Zenda, Beaver County, Utah*, 25 meters east of the center line of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, opposite mile pole 581. (Note 2.)*

* See pp. 162-166.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN SALT LAKE CITY AND ZENDA, UTAH, 1908.

S₁.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 199.)

T₁.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

U₁.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

V₁.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

W₁.—At *Salt Lake City, Salt Lake County, Utah.* (See p. 200.)

X₁.—At *Salt Lake City, Salt Lake County, Utah*, at the corner of Seventh Street west and Ninth Street south, near intersection of Denver & Rio Grande Railroad track and San Pedro, Los Angeles & Salt Lake Railroad passenger track, in the west end of north abutment of the Denver & Rio Grande Railroad bridge over Ninth Street canal, 22.2 meters north of the center line of the San Pedro track, 2.75 meters west of the center line of the Denver & Rio Grande west track, 20 centimeters from face of the abutment. A ½-inch copper bolt set in lead in the horizontal surface of the concrete abutment, concrete marked "U. S."

4352 Slak.—At *Salt Lake City, Salt Lake County, Utah*, a bench mark of the United States Geological Survey, described thus: "*Salt Lake City*, corner of Eleventh Street east and Twelfth Street south, 2 feet north of sidewalk and 100 feet northeast of street crossing; iron post stamped, '4352 Slak.' " Since this bench mark was established, a laundry building, known as the Granite Laundry, has been built over it, and the pipe is under the floor of the laundry office, in the southwest corner of the building. To make connection with the point, it was necessary, in 1906, to have a hole cut in the floor of the office, insert the rod in the hole, and read from the outside through the large plate-glass window. (Note 18.)*

4251 Slak.—At *Salt Lake City, Salt Lake County, Utah*, a bench mark of the United States Geological Survey described thus: "*Salt Lake City*, meridian mark at the southwest corner of the grounds of the city and county buildings, corner of State and Fifth Streets south; bronze tablet cemented in stone post, stamped '4251 Slak.' " (Note 17.)*

O. S. L. Ry. 4222.57.—At *Salt Lake City, Salt Lake County, Utah*, at Seventh Street west and Ninth Street south, at the intersection of the Denver & Rio Grande Railroad track and the San Pedro, Los Angeles & Salt Lake Railroad track, the top of the corner of the concrete block supporting the northwest corner of the platform on the east side of semaphore tower, 0.65 meter from northeast corner of tower, 3.20 meters from south rail of the Oregon Short Line Railway track, 2.42 meters from west rail of Denver & Rio Grande Railroad track. The edge of the platform above the bench is marked with crayon, "O. S. L. B. M. 4222.57."

Y₁.—¼ mile east of *Buena Vista, Salt Lake County, Utah*, near the intersection of the freight and passenger tracks of the San Pedro, Los Angeles & Salt Lake Railroad, about 40 meters north of the former and 47.3 feet south of the center of the latter, on the east side of a stone monument, 18 inches square at the base and about 3 feet high, bearing a bronze plate on the east face marked "S. L. C. C. Limits." The bench mark is a copper bolt with a cross on the face, set vertically in cement on the east side of the monument, close to the ground. This bench is evidently one of the city or county bench marks.

Z₁.—1 mile west of *Buena Vista, Salt Lake County, Utah*, about 10 poles east of mile pole 775, on the east end of the north abutment of culvert 775A, 17.65 feet north of center line of San Pedro, Los Angeles & Salt Lake Railroad track, 10 inches from the north face of the wall, 3½ inches from the edge of the wing wall; set in the horizontal surface of the concrete abutment. (Note 36.)*

A₂.—About 3½ miles west of *Buena Vista, Salt Lake County, Utah*, at the sixth pole west of mile pole 773, 14.2 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad and 3 feet inside of the right of way. (Note 2.)*

B₂.—1 mile east of *Riter, Salt Lake County, Utah*, 2 poles east of mile pole 771, in culvert 771A, on the east side of the south abutment, 4.22 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 27 centimeters from the south face of the culvert, 20 centimeters from the edge of the angle with the wing wall. (Note 36.)*

C₂.—3 miles east of *Garfield, Salt Lake County, Utah*, near mile pole 769, on the east side of the south abutment of culvert 769A, 3.04 meters south of the center of track of San Pedro, Los Angeles & Salt Lake Railroad, 18 centimeters from the north face and 21 centimeters from the northeast face of the abutment. (Note 36.)*

D₂.—1 mile east of *Garfield, Salt Lake County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 3½ poles east of mile pole 767, on the south abutment of culvert 767A, 13 inches from the angle formed by the wing and the wall, 9½ inches from the inner corner of the culvert, 2.73 meters south of the center of the track. (Note 36.)*

E₂.—At *Garfield, Salt Lake County, Utah*, in the concrete building of the Garfield Banking Co., in the northeast corner of the building, occupied by the drug store of the American Trading Co., in the north face of the building, 0.69 meter from the corner, 1.36 meters above the sidewalk. (Note 1.)*

F₂.—At *Garfield, Salt Lake County, Utah*, at the railroad depot opposite a point 12½ rails west from the telegraph office in the station and 46.0 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, in a fence corner, about 18 inches from each fence. (Note 2.)*

G₂.—1½ miles west of *Garfield, Salt Lake County, Utah*, opposite Garfield Smelter, on the San Pedro, Los Angeles & Salt Lake Railroad, on the west end of the north abutment of culvert 763A, 14 centimeters from the north face of the abutment and 11 centimeters from the edge of the wing wall. (Note 4.)*

* See pp. 162-166.

H₂.—3 miles west of Garfield, Salt Lake County, Utah, 4½ poles west of mile pole 763 and about 1 mile west of Garfield Smelter, on the west slope of a small knoll lying south of the track of San Pedro, Los Angeles & Salt Lake Railroad just west of a long fill, about 300 meters distant from a large prominent bluff on the lake shore which marks the line between Salt Lake and Tooele Counties, 22.50 meters from the center of the track, and 7.50 meters outside the right of way, about 5½ feet below and 16 meters from the top of the knoll, about 1 meter higher than grade, a copper bolt leaded vertically into the sloping surface of the rock.

L₂.—At Lake Point, Tooele County, Utah, one rail east of the station sign "Lake Point," 1½ poles west of mile pole 762, 38.60 meters north of center of track of San Pedro, Los Angeles & Salt Lake Railroad, 5 feet lower than the tracks, between the section house and the tool house, 28 paces from the edge of the bluff over Great Salt Lake, the bottom of a hole ⅝ inch deep and 1 inch square, in the top of a sandstone post 2½ feet long and 6 inches square, lettered "U. S. B. M." resting on solid rock and projecting 2 inches above the ground.

J₂.—1 mile west of Lake Point, Tooele County, Utah, 2 poles west of mile pole 761, 9½ rails west of concrete culvert 761A, 13.9 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, a square cut on the highest point of a rock in place, pyramidal in shape, about 3 by 2½ feet, 1½ feet above ground, and about 3 feet inside of the right-of-way fence, 3 feet lower than rails, with the letters U. S. cut roughly on the sloping side toward the tracks.

K₂.—1 mile north of Morris, Tooele County, Utah, 2 rails south of mile pole 759, 17.0 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, on the right of way, 1.76 meters east of a wire fence, 58 paces south of the fence corner, on the sloping surface of a large rock in place, a cross cut on top of a copper bolt set in lead, 45 centimeters from south edge of rock, 37 centimeters from east edge, about 6 inches lower than highest point of rock. The rock is marked "U. S."

L₂.—At Morris, Tooele County, Utah, 1½ rails north of mile pole 758, 25 feet north of the mail crane, 5.79 meters west of the center of the track of San Pedro, Los Angeles & Salt Lake Railroad, about 4 feet below the grade line, in a hard rock in place, a surface 1 by 2 feet exposed, a cross on top of a copper bolt set in lead.

B. M. Ry. 4469.54.—At Erda, Tooele County, Utah, 6 poles east of mile pole 754, a railroad spoke driven horizontally into telegraph pole, pole marked in blue crayon, "4469.54."

M₂.—At Erda, Tooele County, Utah, 2 poles south of mile pole 754, 150 feet west-southwest of the corner of the station building, 59.17 meters west of the center line of San Pedro, Los Angeles & Salt Lake Railroad, 180 feet north of a large rock in place, 6 by 10 by 12 feet exposed, 3 feet east and inside of the right-of-way fence; set on a rocky ledge with 6 inches exposed. (Note 2.)*

N₂.—2 miles west of Erda, Tooele County, Utah, 7 poles west of mile pole 752, in concrete culvert 751B, on the east side of the north abutment, 3.73 meters north of center of the track of San Pedro, Los Angeles & Salt Lake Railroad, 17 centimeters from the face of the abutment, 26 centimeters from the edge of the wing wall. (Note 36.)*

O₂.—At Shields, Tooele County, Utah, 6½ poles south of mile pole 750, 10 rails south of the station sign "Shields," 20.22 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad and 3 feet east of the wire right-of-way fence. (Note 2.)*

P₂.—1 mile east of Tooele, Tooele County, Utah, 3 poles east of mile pole 747, in culvert 747A, in the south end of the east abutment, 4.85 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 18 centimeters from the face of the head wall, 20 centimeters from the edge of the wing wall. (Note 1.)*

Q₂.—1 mile south of Tooele, Tooele County, Utah, opposite mile pole 745 and 1.80 meters east of it, 8.07 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 11.)*

R₂.—3 miles north of Stockton, Tooele County, Utah, 6½ poles north of mile pole 743, in culvert 743A, in the east side of the north abutment, 13 centimeters from the face of the head wall, 15 centimeters from the angle with the wing wall, 3.62 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 36.)*

S₂.—At Stockton, Tooele County, Utah, 3 poles north of mile pole 740, at the northeast corner of Silver Avenue (the street leading east from the railroad station) and the railroad right of way, 59.6 meters east of the center of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 2.50 meters northwest of the corner post of a wire fence. (Note 11.)*

T₂.—1 mile south of Stockton, Tooele County, Utah, 3½ poles north of mile pole 739, in culvert 739A, in the east side of the north abutment, 4.32 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 20 centimeters from the face of the head wall, 30 centimeters from the angle with the wing wall. (Note 36.)*

U₂.—3 miles south of Stockton, Tooele County, Utah, opposite the first telegraph pole north of mile pole 737 and 1.25 meters east of it, 8.77 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad and 6½ meters inside of the right-of-way fence. (Note 2.)*

V₂.—At St. John, Tooele County, Utah, 11½ poles south of mile pole 734, 42.5 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 34.2 meters northwest from the southwest corner of the railroad station, 5 meters from the west side of the roadway. (Note 11.)*

W₂.—1 mile north of Ajax, Tooele County, Utah, opposite the fourth pole north of mile pole 728 and 7.33 meters east of it, 5.74 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.)*

X₂.—1 mile south of Ajax, Tooele County, Utah, 5½ poles north of mile pole 726, at a road crossing at grade, 6.12 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 4.7 meters north of the center of the roadway, in the filling for the pole supporting a crossing warning sign and 0.8 meter west of it. (Note 2.)*

* See pp. 162-166.

Y₂.—At *Faust, Tooele County, Utah*, 3½ poles south of mile pole 721, across the track from the section foreman's house, opposite station sign, 30.8 meters east of the center of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 31.55 meters northeast of the northeast corner of the telegraph office. (Note 11.*)

Z₂.—1 mile south of *Faust, Tooele County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 9½ poles south of mile pole 720, on the west side of the north abutment of culvert 719A, 16 centimeters from the face of the head wall, 27 centimeters from the angle with the wing wall, 5.22 meters west of the center of the track, about 2½ meters below grade. (Note 1.*)

A₃.—4 miles south of *Faust, Tooele County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 3½ poles north of mile pole 717, on the west side of the north abutment of culvert 717A, 26 centimeters from the face of the head wall, 32 centimeters from the angle with the wing wall, 5.72 meters east of the center of the track, about 2 meters below grade. (Note 36.*)

B₃.—At *Vernon, Tooele County, Utah*, 8½ poles south of mile pole 715, 19.12 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, and opposite the station sign. (Note 2.*)

C₃.—1 mile south of *Vernon, Tooele County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 2½ poles north of mile pole 714, in the east end of the south abutment of culvert 714A, 7 centimeters from the face of the head wall, 21 centimeters from the angle with the wing wall, 4.00 meters east of the center of the track. (Note 36.*)

D₃.—At *Dunbar, Tooele County, Utah*, 3½ poles north of the station sign, opposite the sixth pole south of mile pole 712 and 5.9 meters west from same, 17.67 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

E₃.—1 mile south of *Dunbar, Tooele County, Utah*, near fourth pole south of mile pole 711 and 16.9 meters from same, opposite a "C" post on the east side of the track, 10.17 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter above grade. (Note 2.*)

F₃.—1 mile north of *Lofgreen, Tooele County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 7½ poles south of mile pole 709, in the east side of the north abutment of culvert 708C, 20 centimeters from the face of the head wall, 15 centimeters from the angle with the wing wall, 5.59 meters east of the center of the track. (Note 1.*)

G₃.—At *Lofgreen, Tooele County, Utah*, 5 rails north of the station sign "Lofgreen," 21.07 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 4.85 meters northwest of the nearest telegraph pole. (Note 11.*)

H₃.—1 mile north of *Boulter, Tooele County, Utah*, 1½ poles north of mile pole 703, opposite the sign "One mile to Boulter," 10.55 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 16.*)

I₃.—At *Boulter, Tooele County, Utah*, near first pole south of mile pole 702, and 4.57 meters from it, 15.47 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

J₃.—In *Juab County*, 2 miles south of *Boulter, Tooele County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 4 poles north of mile pole 700, in the west end of the north abutment of culvert 700A, 17 centimeters from the face of the head wall, 19 centimeters from the angle with the wing wall. (Note 1.*)

K₃.—2 miles north of *Tintic, Juab County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 7 poles north of mile pole 698, on the west end of the north abutment of culvert 698A, 15 centimeters from the face of the head wall, 27 centimeters from the angle with the wing wall, 4.55 meters west of the center of the track. (Note 36.*)

L₃.—At *Tintic, Juab County, Utah*, 4 poles north of mile pole 696, 42.6 meters east of the center of the main track of the San Pedro, Los Angeles & Salt Lake Railroad, 31.8 meters northeast of the northeast corner of the passenger station, 13.6 meters northeast of a telegraph pole, 3 meters east of the edge of the roadway. (Note 11.*)

M₃.—1¼ miles east of *Tintic, Juab County, Utah*, on railroad spur to Eureka, 13.50 meters west of second pole west of station sign "Mammoth Junction," 9 rails west of same sign, 8.52 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, in a flat rock in situ. (Note 36.*)

U.S.G.S. 6394.—At *Eureka, Juab County, Utah*, on Church Street, at the northeast corner of the courthouse, 45 centimeters from this corner, 21 centimeters from the courthouse wall, 10.45 meters northwest of the northeast corner of the San Pedro, Los Angeles & Salt Lake Railroad passenger station. Stamped, "Elevation above sea, 6,394 feet. Datum U. P." (Note 18.*)

N₃.—3 miles south of *Tintic, Juab County, Utah*, 3 poles south of mile pole 693, 10.57 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 6.30 meters from the north post of a rack for spare rails. (Note 2.*)

O₃.—At *McIntyre, Juab County, Utah*, opposite station sign, 1½ rails north of a highway crossing sign, 18.20 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 8.50 meters from the center of the highway. (Note 11.*)

P₃.—3 miles south of *McIntyre, Juab County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 8½ poles north of mile pole 686, in the east end of the south abutment of culvert 686A, 22 centimeters from the face of the head wall, 18 centimeters from the angle with the wing wall 3.04 meters east of the center of the track. (Note 1.*)

Q₃.—At *Jericho, Juab County, Utah*, 9 rails north of the station sign, 2½ poles south of mile pole 683, 40.40 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. (Note 2.*)

R₃.—2 miles south of *Jericho, Juab County, Utah*, 2½ poles south of mile pole 681, 21.32 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 24.8 meters from the second pole, 27.9 meters from the third pole, of above mile pole, 1 meter below grade. (Note 2.)*

S₃.—4½ miles south of *Jericho, Juab County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 2 poles south of mile pole 678.5, in the west end of the north abutment of culvert 678A, 12 centimeters from the face of the head wall, 18 centimeters from the angle with the wing wall, 3.26 meters west of the center of the track. (Note 36,* brass bolt used.)

T₃.—At *Dyer, Juab County, Utah*, near third pole north of mile pole 677, and 15.80 meters southwest of it, 26.70 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1½ meters below grade. (Note 11.)*

U₃.—1 mile south of *Dyer, Juab County, Utah*, near mile pole 676, and 17 meters south of it, 21.17 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.)*

V₃.—At *Champlin, Juab County, Utah*, opposite station sign, 13 poles south of mile pole 673, 37.59 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at subgrade of the present siding. (Note 11.)*

W₃.—3½ miles north of *Lynn Junction, Millard County, Utah*, opposite mile pole 667, 21.62 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.)*

X₃.—2½ miles north of *Lynn Junction, Millard County, Utah*, opposite mile pole 666, 21.32 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.)*

Y₃.—2 miles north of *Lynn Junction, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 11 poles north of mile pole 665, in the east end of the south abutment of culvert 665A, 10 centimeters from the face of the head wall, 16 centimeters from the angle with the wing wall, 3.71 meters east of the center of the track. (Note 36,* brass bolt used.)

Z₃.—At *Lynn Junction, Millard County, Utah*, 91.0 meters northwest of the northwest corner of the passenger station of the San Pedro, Los Angeles & Salt Lake Railroad, 14 poles south of mile pole 664, and 70.6 meters west of the center of the track. (Note 2.)*

A₄.—1½ miles west of *Lynn Junction, Millard County, Utah*, opposite mile pole 662, 23.88 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.)*

B₄.—3½ miles west of *Lynn Junction, Millard County, Utah*, opposite mile pole 660, 27.72 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.)*

C₄.—2 miles west of *Cline, Millard County, Utah*, opposite mile pole 656, 26.82 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, ½ meter below grade. (Note 2.)*

D₄.—4 miles west of *Cline, Millard County, Utah*, 4½ poles east of mile pole 654, 16.82 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 28.1 meters from fourth pole and 21.0 meters from fifth pole east of mile pole. (Note 2.)*

E₄.—4 miles east of *Akin, Millard County, Utah*, ½ mile west of bridge over Sevier River, 4 poles west of mile pole 651, 11.52 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 9.0 meters from the edge of the bluff overlooking the old river channel. (Note 2.)*

F₄.—At *Akin, Millard County, Utah*, 4½ poles north of mile pole 645, opposite station sign, 26.82 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.)*

G₄.—2 miles east of *Oasis, Millard County, Utah*, opposite mile pole 644, 19.03 meters south of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.)*

U.S.G.S. 4592.—At *Oasis, Millard County, Utah*, 4 poles south of mile pole 642, at the southeast corner of the Hotel Day, 25 centimeters from the corner of the building, 29.30 meters southeast of the southeast corner of the station platform, 37.22 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad. An iron pipe bearing a bronze cap stamped "U. S. Boundary Post. No. —," set in the ground with 10 inches exposed.

H₄.—At *Oasis, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 6 poles south of mile pole 642, 10 centimeters from each face of the southwest corner of the southwest foundation of the windmill tower over the railroad pumping station, 4.57 meters east of the center of the track. (Note 1.)*

I₄.—2 miles south of *Oasis, Millard County, Utah*, 13.6 meters north of mile pole 640, 12.42 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.)*

J₄.—At *Van, Millard County, Utah*, opposite mile pole 637, 27.02 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below subgrade. (Note 2.)*

K₄.—At *Jerome, Millard County, Utah*, opposite mile pole 633, 32.0 meters northwest of station sign "Jerome," 24.70 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, on a slight rise of ground, 1 meter above grade. (Note 2.)*

L₄.—At *Clear Lake, Millard County, Utah*, near fifteenth pole south of mile pole 629, opposite north end of passenger station, 29.50 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 2 meters below grade. (Note 2.)*

M₄.—2½ miles south of *Neels, Millard County, Utah*, opposite mile pole 621, 24.50 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.)*

N₄.—1½ miles south of *Borden, Millard County, Utah*, opposite mile pole 617, 33.50 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 8.7 meters east of a wagon trail, at grade. (Note 2.)*

O₄.—2 miles north of *Goss Station, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 6 poles north of mile pole 614, in the concrete intake to the section-house cistern, 17 centimeters east of the center of the intake pipe, 2.72 meters east of the center of the track. (Note 36.*)

P₄.—At *Goss, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 6½ poles south of mile pole 612, in the west end of the north abutment of culvert 611B, 24 centimeters from the head wall, 38 centimeters from the angle with the wing wall, near the pumping station, 3.50 meters west of the center of the track. (Note 36.*)

Q₄.—2 miles south of *Goss, Millard County, Utah*, opposite mile pole 610, 30.80 meters west of the center of the tracks of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 2.*)

R₄.—At *Cruz, Millard County, Utah*, opposite mile pole 607, 4½ poles south of the station sign, 33.52 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, slightly below grade. (Note 2.*)

S₄.—1 mile south of *Cruz, Millard County, Utah*, 2 poles south of mile pole 606, in the horizontal surface of the limestone coping of the northeast wing wall of culvert 605B, 24 centimeters from the inner face of the wing wall, and 55 centimeters from the end, 5.87 meters east of the center of the track. (Note 15.*)

T₄.—1 mile east of *Pumice, Millard County, Utah*, opposite mile pole 603, 25.62 meters north of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, at grade. (Note 2.*)

U₄.—At *Pumice, Millard County, Utah*, 4 poles east of mile pole 602, in the wall facing the track of the western concrete section house, 1.35 meters from the southeast corner of the house, 1.40 meters from the ground, 21.90 meters north of the track. (Note 1.*)

V₄.—½ mile west of *Pumice, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 8 poles west of mile pole 602, 17 centimeters from the face, 81 centimeters from the end of the northwest wing wall, in the horizontal surface of the limestone coping of culvert 601C, 5.08 meters north of the center of the track. (Note 15.*)

W₄.—At *Black Rock, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 1½ poles south of mile pole 597, in the east end of the north abutment of culvert 596A, 24 centimeters from the face of the head wall, 34 centimeters from the angle with the wing wall, 5.75 meters east of the center of the track. (Note 1.*)

X₄.—At *Black Rock, Millard County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 2 poles south of mile pole 597, in the southwest corner of the main pedestal of the concrete base of the railroad water tank, 9 centimeters from each face of the pedestal, 5.85 meters east of the center of the track. (Note 16.*)

Z₄.—At *Malone, Millard County, Utah*, opposite station sign, 5½ poles north of mile pole 592, 22.0 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1½ meters below grade. (Note 55.*)

A₅.—3 miles north of *Read, Millard County, Utah*, opposite mile pole 590, 24.10 meters west of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 2 meters below grade. (Note 55.*)

B₅.—At *Read, Beaver County, Utah*, on the San Pedro, Los Angeles & Salt Lake Railroad, 6 poles north of mile pole 587B5, in the concrete inlet to the section-house cistern, 18 centimeters west of the center of the drainpipe, 2.50 meters west of the center of the track. (Note 36.*)

C₅.—At *Read, Beaver County, Utah*, opposite mile pole 587, 19.12 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, 1 meter below grade. (Note 11.*)

D₅.—Two miles south of *Read, Beaver County, Utah*, opposite mile pole 585, 23.30 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, ½ meter below grade. (Note 11.*)

E₅.—At *Zenda, Beaver County, Utah*, opposite station sign, 9½ poles south of mile pole 583, 26.10 meters east of the center of the track of the San Pedro, Los Angeles & Salt Lake Railroad, ½ meter below grade. (Note 11.*)

I₉.—Near *Zenda, Beaver County, Utah*. (See p. 215.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN CRAWFORD, NEBR., AND CADIZ, WYO., 1908.

H₄.—At *Fort Robinson, Dawes County, Nebr.* (See Appendix 3, Report for 1903, p. 799.)

G₄.—At *Crawford, Dawes County, Nebr.* (See Appendix 3, Report for 1903, p. 799.)

N₄.—At *Crawford, Dawes County, Nebr.*, 475 meters northwest of the Chicago, Burlington & Quincy Railroad station, 125 meters northwest of the Chicago & Northwestern Railroad crossing, and 4.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete water tank support nearest the track. (Note 4.*)

O₄.—About 2.5 miles northwest of *Crawford, Dawes County, Nebr.*, about halfway between mile poles 425 and 426, on the east wall of a concrete cattle pass, and 30 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

P₄.—At *Horn (formerly Remington), Dawes County, Nebr.*, 25.2 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 25 meters north (measured along the tracks) of station signboard. (Note 11.*)

Q₄.—About 4.6 miles northwest of *Horn (formerly Remington), Dawes County, Nebr.*, just south of Dawes-Sioux County line, 9½ poles southeast of mile pole 484 (old numbering, or about 433.08 new numbering), 29.6 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 2.*)

R₄.—About 3.1 miles southeast of *Joder (formerly Adelia), Sioux County, Nebr.*, just north of Dawes-Sioux County line, on the southwest wall of a concrete culvert, 2.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

S₁.—About 1.1 miles southeast of *Joder* (formerly *Adelia*), *Sioux County, Nebr.*, 2.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the southwest wall of a concrete culvert near Rosenberg's ranch. (Note 4.)*

T₁.—At *Joder* (formerly *Adelia*), *Sioux County, Nebr.*, 22.6 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 150 meters northwest of the telephone booth, and directly opposite the switch stand at the northwest end of the house track on *Joder* siding. (Note 11.)*

U₁.—At *Orella* (formerly *Harold* siding, and now *Adelia* postoffice), *Sioux County, Nebr.*, 30.0 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 90 meters north (measured along track) of the temporary railroad station, and directly opposite Hamilton's store. (Note 11.)*

V₁.—About 3 miles north of *Orella*, *Sioux County, Nebr.*, 26.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, about $\frac{3}{5}$ of the distance from mile pole 443 to 444, and 5 meters east of snow fence at north end of the cut on a curve. (Note 2.)*

W₁.—At *Mansfield*, *Sioux County, Nebr.*, 32.7 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 210 meters north of the station signboard, and 50 meters south of the section house. (Note 11.)*

N.-S.D. 204 M.—About 1.5 miles south of *Ardmore*, *Fall River County, S. Dak.*, 277 meters west of the center of the main track of the Chicago, Burlington & Quincy Railroad, in the center of the highway. The mark is the top surface of a 1-inch raised square on the top of the State line monument, a red granite post 1 foot square and projecting 4 feet above the ground, lettered "N" on the south face, "S.D." on the north face and "20417" on the east face.

O₁.—At *Ardmore*, *Fall River County, S. Dak.*, 10.0 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the south end of one of the concrete supports of the water-tank column. (Note 4.)*

3553 DW.—At *Ardmore*, *Fall River County, S. Dak.*, 154.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 195 meters northwest of the temporary railroad station, and 19 meters north of the center of the east-and-west road. (Note 18.)*

3527 DW.—About 2.3 miles north of *Ardmore*, *Fall River County, S. Dak.*, 164 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, about 400 meters north of bridge 452.14 over Hat Creek, and 11.6 meters east of the center of highway at a turn in the road. (Note 18.)*

3487 DW.—About 3.0 miles southeast of *Rumford*, *Fall River County, S. Dak.*, 202 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, about 130 meters south of bridge 455.39 over Duck Creek, and 11 meters east of the center line of the north-and-south highway. (Note 18.)*

3500 DW.—At *Rumford*, *Fall River County, S. Dak.*, 21.6 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 240 meters southeast of the station signboard, and 150 meters northwest of the southeast end of the siding. (Note 18.)*

3532 DW.—About 2.3 miles northwest of *Rumford*, *Fall River County, S. Dak.*, a short distance northwest of mile pole 461, and 23.1 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.)*

3632 DW.—About 3.2 miles east of *Provo*, *Fall River County, S. Dak.*, about $\frac{1}{2}$ mile east of mile pole 464, and 16 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.)*

3708 DW.—At *Provo*, *Fall River County, S. Dak.*, 16.3 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 190 meters southeast of the railroad station. (Note 18.)*

P₁.—About 2.6 miles northwest of *Provo*, *Fall River County, S. Dak.*, about halfway between mile poles 469 and 470 and 24.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 2.)*

Q₁.—About 1.5 miles southeast of *Dennis*, *Fall River County, S. Dak.*, on the east end of the north concrete abutment of the plate girder bridge over Coal Creek, 2.2 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.)*

3528 DW.—About 0.7 mile northeast of *Dennis*, *Fall River County, S. Dak.*, near the middle of the first curve north of *Dennis* siding, 20 meters southeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 23 meters northwest of the bank of Cottonwood Creek. (Note 18.)*

R₁.—About 1.7 miles southwest of *Edgemont*, *Fall River County, S. Dak.*, 220 meters west of the signboard "Yard Limit," 4.5 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the lowest stone at the north end of the east abutment of a small stone bridge. (Note 5.)*

S₂.—At *Edgemont*, *Fall River County, S. Dak.*, 113.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, in the southwest corner of the city park, near the public-school building, 0.5 meter from the south fence and 0.7 meter from the west fence. (Note 2.)*

T₂.—At *Edgemont*, *Fall River County, S. Dak.*, on the northeast corner of the store building known as the Edgemont Block, 0.2 meter above the sidewalk and 0.2 meter from the northeast corner, facing Phelan Avenue. (Note 1.)*

3449 DW.—At *Edgemont*, *Fall River County, S. Dak.*, 15.7 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the north end of the Chicago, Burlington & Quincy Railroad Hotel park. (Note 18.)*

U₁.—At *Edgemont, Fall River County, S. Dak.*, 650 meters north of the Chicago, Burlington & Quincy Railroad station, on the west end of the south concrete abutment of the plate-girder bridge over the south fork of the Cheyenne River. (Note 1.*)

3463 DW.—About 4 miles northwest of *Edgemont, Fall River County, S. Dak.*, 120 meters southeast of pile-trestle bridge No. 480.48, and 31 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just outside of the right of way. (Note 18.*)

3486 DW.—At *Marietta, Fall River County, S. Dak.*, directly opposite the section house at the northwest end of the siding, 85 meters southeast of bridge No. 484.36 and 23.4 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

3544 DW.—About 2.7 miles northwest of *Marietta, Fall River County, S. Dak.*, 100 meters southeast of trestle No. 487.10 and 30 meters southwest of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

3632 DW.—At *Argentine, Fall River County, S. Dak.*, 50 meters southeast of the north water tank (measured along the track), 29.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 10 meters northeast of the center of the highway. (Note 18.*)

V₁.—At *Argentine, Fall River County, S. Dak.*, at the north end of the siding, on the east end of the south concrete abutment of plate-girder bridge No. 490.44 over Pass Creek, and 2.2 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

W₁.—About 2.0 miles southeast of *Dewey, Custer County, S. Dak.*, and about halfway between mile poles 493 and 494, 33 meters southeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the tangent between the first and second curves south of Dewey. (Note 2.*)

X₁.—About 0.8 mile southeast of *Dewey, Custer County, S. Dak.*, 2.5 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the east end of the north concrete abutment of bridge No. 495.00. (Note 4.*)

3704 DW.—At *Dewey, Custer County, S. Dak.* (formerly *S. G. Ranch*), 18 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the old water tank and 22 meters west of Matesson's general store. (Note 18.*)

S. D.-WY. 38.24.—About 2 miles north of *Dewey, Custer County, S. Dak.*, 40 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the foot of the "Wyoming Hill." The mark is the top of a State-line monument, a yellow sandstone post 10 inches square, projecting 1 meter above the ground, lettered "S. D." on the east face, "WY" on the west face, "38.24 M" on the south face, and "1904" on the north face. (Note 5.*)

Q₁.—At *Dakoming, Weston County, Wyo.*, 29 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad and directly opposite the station signboard. (Note 2.*)

R₁.—At *Clifton, Weston County, Wyo.*, 40 meters southeast of the railroad station, 4.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northwest end of the masonry water-tank pier nearest the tracks. (Note 4.*)

S₁.—At *Clifton, Weston County, Wyo.*, 30 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 48 meters northwest of the railroad station (measured along the track). (Note 1.*)

T₁.—About 1.6 miles northwest of *Clifton, Weston County, Wyo.*, about halfway between mile poles 505 and 506, 2.4 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the east wall of a small concrete bridge, directly over the central pier. (Note 4.*)

3971 DW.—About 2.6 miles northwest of *Clifton, Weston County, Wyo.*, 310 meters northwest of the center of the plate-girder bridge 506.48 over Whoop-Up Canyon, 23 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad and 11 meters southwest of the center of the Edgemont-Newcastle wagon road. (Note 18.*)

4120 DW.—About 2.2 miles south of *Spencer, Weston County, Wyo.*, 425 meters northeast of the center of railroad bridge 512.49, on the north side of the Edgemont-Newcastle road at the railroad crossing and 9.8 meters northwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

4195 DW.—At *Spencer, Weston County, Wyo.*, 172 meters north of the station signboard, on the south side of the highway at the railroad crossing, and 11.3 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

4344 DW.—About 3 miles east of *Newcastle, Weston County, Wyo.*, on the southwest side of the Newcastle-Custer wagon road at a fork in the road, about 0.5 mile northeast of a point on the Chicago, Burlington & Quincy Railroad which point is 0.5 mile southeast of the telephone booth at Johnsons siding and $\frac{1}{8}$ mile northwest of mile pole 518. (Note 18.*)

U₂.—At *Johnson Siding, Weston County, Wyo.*, 30 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the telephone booth, and 85 meters southeast of bridge No. 518.80. (Note 2.*)

V₂.—At *Newcastle, Weston County, Wyo.*, 5.8 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the northwest point of the railroad station park. (Note 2.*)

W₂.—At *Newcastle, Weston County, Wyo.*, directly opposite the Chicago, Burlington & Quincy Railroad station, at the south corner of the Riordan Building, 1.1 meters above the sidewalk. (Note 1.*)

X₆.—At *Newcastle, Weston County, Wyo.*, at the north end of the Warren Street face of the Newcastle City Hall, in the water-table stone, 0.4 meter above the sidewalk. (Note 1.*)

4332 DW.—At *Newcastle, Weston County, Wyo.*, at the north corner of Summer and Woodstock Streets, 4.0 meters north of property corner, in the center of the top of a sandstone post 8 by 8 inches, 3 feet long, set 34 inches into the ground. (Note 17.*)

U. S. G. S. M. M.—At *Newcastle, Weston County, Wyo.*, 17 meters southeast of the center line of the Cambria branch of the Chicago, Burlington & Quincy Railroad, and 61 meters southwest of pile-trestle bridge No. 0.49. The mark is a square cut on a limestone post 10 by 10 inches by 2 feet, in the center of whose top is cemented a bronze tablet. Inasmuch as the stone has probably been disturbed and is inclined at an angle of 30°, the square cut is used as the mark instead of the bronze tablet. (Note 16.*)

4171 DW.—About 5.5 miles west of *Newcastle, Weston County, Wyo.*, 290 meters east of overhead railroad bridge No. 526.12 and directly north of United States Experimental Agricultural Farm, on the north side of the wagon road and 25 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 18.*)

Y₆.—At *Pedro, Weston County, Wyo.*, 39 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the point where the wagon road crosses the tracks, 130 meters east of the station signboard and telephone booth. (Note 2.*)

4218 DW.—About 2.2 miles northwest of *Pedro, Weston County, Wyo.*, about $\frac{1}{4}$ mile northeast of the Chicago, Burlington & Quincy Railroad tracks, at the "YT" ranch, 3 meters north of the dwelling house on the south side of the road, 20 meters west of Skull Creek. (Note 18.*)

Z₆.—About 2.3 miles southeast of *Osage, Weston County, Wyo.*, 30 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the summit of the long grade northwest of the "YT" ranch, and near the middle of the snow fence. (Note 2.*)

4312 DW.—About 0.3 mile south of *Osage, Weston County, Wyo.*, 23 meters east of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 9 meters north of the center of the wagon road at the railroad crossing. (Note 18.*)

A₇.—At *Jerome, Weston County, Wyo.*, 5 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the southeast end of the masonry water-tank pier nearest the tracks. (Note 4.*)

B₇.—At *Jerome, Weston County, Wyo.*, 37.8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 45 meters northwest of the section house, just inside the railroad right of way. (Note 2.*)

C₇.—About 2.0 miles northwest of *Jerome, Weston County, Wyo.*, on the southwest end of the northwest concrete pier of bridge No. 545.10 of the Chicago, Burlington & Quincy Railroad, 2.7 meters below the top of the rail. (Note 4.*)

D₇.—About 0.5 mile southeast of *Upton, Weston County, Wyo.*, on the northeast end of the northwest concrete abutment of bridge No. 548.42 of the Chicago, Burlington & Quincy Railroad. (Note 4.*)

E₇.—At *Upton, Weston County, Wyo.*, 170 meters southeast of the railroad station, and 2.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northeast foundation wall of the coal elevator. (Note 4.*)

F₇.—At *Upton, Weston County, Wyo.*, 190 meters northeast of the Chicago, Burlington & Quincy Railroad, in the concrete window sill on the northeast side of the concrete block building known as "Upton Hall." (Note 1.*)

G₇.—At *Upton, Weston County, Wyo.*, northwest of the railroad station, 28 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete water-tank foundation wall nearest the tracks. (Note 1.*)

H₇.—At *Thornton, Weston County, Wyo.*, 65 meters northwest of railroad station, 18 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northwest side of the road crossing, just inside the railroad right of way. (Note 2.*)

I₇.—About 2.2 miles southeast of *Kara, Crook County, Wyo.*, near the middle of the second curve east of Kara siding, 14.4 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 2.*)

J₇.—At *Kara, Crook County, Wyo.*, directly opposite station signboard and 15 meters northwest of the telephone booth, 21 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad. (Note 1.*)

K₇.—At *Kara, Crook County, Wyo.*, 100 meters west of the west end of Kara siding, and 10 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle span of a concrete culvert. (Note 4.*)

L₇.—About 0.8 mile northwest of *Kara, Crook County, Wyo.*, $\frac{1}{4}$ mile northwest of section pole D 94-D 95, 12 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the span of a concrete culvert, 8 meters below the track. (Note 4.*)

M₇.—About 4.8 miles southeast of *Moorcroft, Crook County, Wyo.*, 4.0 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the span of a small concrete culvert, 300 meters south of the first wagon road crossing north of Kara siding. (Note 4.*)

N₇.—About 2.7 miles southeast of *Moorcroft, Crook County, Wyo.*, 7 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the span of a small concrete culvert, 390 meters southeast of road crossing at a small ranch. (Note 4.*)

O₇.—At *Moorcroft, Crook County, Wyo.*, 34 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete foundation of the southeast water tank, 30 meters east of railroad station; set vertically. (Note 1.)*

P₇.—At *Moorcroft, Crook County, Wyo.*, 4.6 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the masonry foundation of the northwest water tank, 40 meters northwest of railroad station. (Note 16.)*

Q₇.—At *Moorcroft, Crook County, Wyo.*, 38 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, 15 meters southwest of the center of highway, 71 meters northwest of road crossing, and 140 meters northwest of railroad station. (Note 1.)*

R₇.—About 1.5 miles northwest of *Moorcroft, Crook County, Wyo.*, on the southwest end of the southeast concrete abutment of bridge No. 570.74 over the Belle Fourche, or the North Fork of the Cheyenne River. (Note 1.)*

S₇.—About 2.2 miles northwest of *Moorcroft, Crook County, Wyo.*, on the south end of the east concrete abutment of Chicago, Burlington & Quincy Railroad bridge No. 571.41 over Donkey Creek. (Note 4.)*

T₇.—About 2.0 miles southeast of *Wessex, Crook County, Wyo.*, 4.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the northeast end of the southeast abutment of a small concrete culvert, 1.6 meters below the top of the rail. (Note 4.)*

U₇.—At *Wessex, Crook County, Wyo.*, 350 meters west of station signboard, 28 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 2.)*

V₇.—At *Rozet, Crook County, Wyo.*, 29 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite store and post office, on east side of railroad crossing, just inside right of way. (Note 2.)*

W₇.—About 4.4 miles west of *Rozet, Crook County, Wyo.*, on the north end of the east concrete abutment of the Chicago, Burlington & Quincy Railroad bridge No. 586.50. (Note 5.)*

X₇.—At *Minturn, Crook County, Wyo.*, 180 meters west of the station signboard and 17 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 1.)*

Y₇.—About 4.2 miles east of *Gillette, Crook County, Wyo.*, 8.5 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at east end of cut showing rock exposure, on top of a large flat bowlder, 2.0 meters below the top of the rail. (Note 5.)*

Z₇.—At *Gillette, Crook County, Wyo.*, 6 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at the northeast corner of the railroad station park. (Note 2.)*

A₈.—At *Gillette, Crook County, Wyo.*, at the southwest corner of Olzer's concrete store building, facing Gillette Avenue, 0.2 meter above the sidewalk. (Note 1.)*

B₈.—At *Gillette, Crook County, Wyo.*, 6 meters south of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the center of the most easterly concrete pier of the coal shutes. (Note 4.)*

C₈.—About 3.1 miles west of *Gillette, Crook County, Wyo.*, about $\frac{1}{4}$ mile west of mile pole 600, 22 meters south of the center of the main track of the Chicago, Burlington & Quincy Railroad, on a chiseled bench on the low flat outcrop of rock at the east end of a cut on a curve 0.5 meter above the top of the rail. (Note 16.)*

D₈.—At *Sparta, Crook County, Wyo.*, 300 meters east of the station signboard and 24 meters north of the center line of the main track of the Chicago, Burlington & Quincy Railroad, near railroad fence line, just west of telephone booth. (Note 2.)*

E₈.—At *Oriva, Crook County, Wyo.*, 4.3 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 20 meters southeast of the railroad station, on the southeast end of the old masonry water-tank pier nearest the tracks. (Note 16.)*

F₈.—At *Oriva, Crook County, Wyo.*, 31 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 80 meters northwest of the railroad station, just inside the right of way near the snow fence. (Note 2.)*

G₈.—About 1.5 miles northwest of *Oriva, Crook County, Wyo.*, 2.5 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the concrete coping of a bridge, directly over the northeast pier. (Note 4.)*

H₈.—At *Kier, Crook County, Wyo.*, 25 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the station signboard and north of the telephone booth, 1 meter above the top of the rail. (Note 2.)*

I₈.—About 1.3 miles southeast of *Felix, Crook County, Wyo.*, about halfway between mile poles 614 and 615, 10 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at northwest end of a cut, on the flattest of a group of rocks. (Note 16.)*

J₈.—At *Felix, Crook County, Wyo.*, about 325 meters southeast of the railroad station, 140 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, a point just outside the right-of-way fence. (Note 2.)*

K₈.—At *Felix, Crook County, Wyo.*, 4.3 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 20 meters northwest of the railroad station, on the northwest end of the masonry water-tank pier nearest the tracks. (Note 16.)*

* See pp. 162-166.

L₈.—About 2.9 miles northwest of *Felix, Crook County, Wyo.*, on the northeast end of the southeast concrete pier of plate-girder bridge No. 618.62 of the Chicago, Burlington & Quincy Railroad over Wild Horse Creek, 2.3 meters below the top of the rail. (Note 4.)*

M₈.—At *Echeta, Crook County, Wyo.*, 25.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the middle of the second concrete water-tank pier, counting from the northwest. (Note 4.)*

N₈.—At *Echeta, Crook County, Wyo.*, 27.2 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just north of the railroad station and on the north side of the highway. (Note 2.)*

O₈.—About 2.1 miles northwest of *Echeta, Crook County, Wyo.*, and about halfway between mile poles 623 and 624, 6 meters southeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the end of the west wing wall of a concrete culvert and cattle pass, 2.5 meters below the top of the rail. (Note 4.)*

P₈.—At *Croton, Crook County, Wyo.*, 8 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, on the southeast end of the third masonry water-tank pier from the tracks. (Note 16.)*

Q₈.—At *Croton, Crook County, Wyo.*, 22 meters southwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, directly opposite the old railroad station and the northwest end of Croton siding, outside the right of way and just northeast of the county road. (Note 2.)*

Rail A. —About 2.5 miles south of *Lariat, Sheridan County, Wyo.*, 14.5 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, at about mile pole 631.2. The mark is an aluminum tablet, set in a stone flush with the ground with triangle and circle in center, marking a station of the United States Geological Survey in the location of the Sheridan-Crook County line in 1908.

R₈.—At *Lariat, Sheridan County, Wyo.*, opposite the section house 175 meters south of the north end of Lariat siding, 36 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 2.)*

S₈.—At *Arvada, Sheridan County, Wyo.*, 450 meters south of the railroad station, on the northeast end of the northwest concrete pier of the Chicago, Burlington & Quincy Railroad bridge No. 640.73 over Powder River, 1 meter below the top of the rail. (Note 1.)*

T₈.—At *Arvada, Sheridan County, Wyo.*, 40 meters south of the railroad station, 7.5 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and just north of the mail catcher. (Note 2.)*

U₈.—At *Arvada, Sheridan County, Wyo.*, 50 meters north of the railroad station, 4.7 meters west of the center line of the main track of the Chicago, Burlington & Quincy Railroad on the south end of the masonry water-tank pier nearest the track. (Note 16.)*

V₈.—At *Kendrick, Sheridan County, Wyo.*, directly opposite the road crossing and telegraph office near the northeast end of Kendrick siding, 34 meters northwest of the center line of the main track of the Chicago, Burlington & Quincy Railroad, just inside the right of way. (Note 2.)*

W₈.—At *Cadiz, Sheridan County, Wyo.*, 15 meters northeast of the center line of the main track of the Chicago, Burlington & Quincy Railroad, and 20 meters northwest of the road crossing, just inside the right of way, on a sandstone boulder flush with ground. (Note 5.)*

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN HUNTLEY, MONT., AND CADIZ, WYO., 1908.

U. S. R. S. 2.—Near *Huntley, Yellowstone County, Mont.* (See p. 210.)

U. S. R. S. 3.—Near *Huntley, Yellowstone County, Mont.* (See p. 210.)

U. S. R. S. 4.—At *Huntley, Yellowstone County, Mont.*, 24 meters south of the main office building of the United States Reclamation Service, 1 meter from the Northern Pacific right-of-way fences. (Note 18.)*

U. S. R. S. 5.—About 0.7 mile east of *Huntley, Yellowstone County, Mont.*, at the first crossing of the Huntley main-line canal under the Chicago, Burlington & Quincy Railroad, in the center of the south coping, 3.52 meters south of the center of the track, and 20 centimeters from the face of the head wall. (Note 17,* unstamped.)

U. S. R. S. 6.—About 1.6 miles east of *Huntley, Yellowstone County, Mont.*, 75 meters west of a highway bridge over the Huntley main-line canal, 88.5 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 41.3 meters north of the north water line of the canal. (Note 17,* unstamped.)

U. S. R. S. 7.—About 2.2 miles east of *Huntley, Yellowstone County, Mont.*, opposite Chicago, Burlington & Quincy Railroad bridge 826.85, in a culvert crossing for a small stream under the Huntley main-line canal, in the center of the south coping of the culvert, 28.8 meters north of the center of the railroad track, 17 centimeters from the face of the head wall. (Note 17,* unstamped.)

U. S. R. S. 8.—About 3.5 miles east of *Huntley, Yellowstone County, Mont.*, opposite the Chicago, Burlington & Quincy Railroad bridge 825.50, in the concrete spillway for a small stream over the Huntley main-line canal, at the south end of the west parapet wall, 45 meters north of the center of the railroad track, and 8.5 meters south of the center of the canal. (Note 17,* unstamped.)

U. S. R. S. 9.—About 3.9 miles west of *Ballantine, Yellowstone County, Mont.*, in the second crossing of the Huntley main-line canal under the Chicago, Burlington & Quincy Railroad, in the center of the south coping, 3.2 meters south of the center of the track. (Note 17,* unstamped.)

*See pp. 162-166.

U. S. R. S. 10.—About 2.9 miles west of *Ballantine, Yellowstone County, Mont.*, opposite the Chicago, Burlington & Quincy Railroad bridge 823.12, in the east end of the southwest coping of an aqueduct over the Huntley main-line canal, 52.3 meters south of the center of the railroad track, and 14.9 meters south of the center of the canal. (Note 17,* unstamped.)

U. S. R. S. 11.—About 2.2 miles west of *Ballantine, Yellowstone County, Mont.*, in the turnout of Lateral E from the Huntley main-line canal, in the center of the top of the concrete head gate, on the north side of the canal, 27.5 meters south of the center of the Chicago, Burlington & Quincy Railroad track. (Note 54,* unstamped.)

E₇.—About 1 mile west of *Ballantine, Yellowstone County, Mont.*, in the horizontal surface of the concrete coping at the north end of the east abutment of the Chicago, Burlington & Quincy Railroad bridge 821.19, 20 centimeters from the west face and 64 centimeters from the north face. (Note 14.*)

U. S. G. S. 2982.—At *Ballantine, Yellowstone County, Mont.*, 55.9 meters northwest of the northwest corner of the platform of the railroad station, and 44.7 meters north of the center of the Chicago, Burlington & Quincy Railroad track. (Note 18,* unstamped.)

U. S. R. S. 12.—About 0.3 mile east of *Ballantine, Yellowstone County, Mont.*, in the center of the north coping of the third crossing of the Huntley main-line canal under the Chicago, Burlington & Quincy Railroad, 3.54 meters north of the center of the track and 20 centimeters from the face of the head wall. (Note 54,* unstamped.)

U. S. R. S. 13.—About 1.6 miles east of *Ballantine, Yellowstone County, Mont.*, in the center of the concrete coping of the crossing of Lateral H. A., and the Chicago, Burlington & Quincy Railroad, 3.36 meters north of the center of the track, and 13 centimeters from the face of the head wall. (Note 54,* unstamped.)

U. S. R. S. 14.—About 2.4 miles east of *Ballantine, Yellowstone County, Mont.*, in the center of the coping of the crossing of Lateral H. B. under the Chicago, Burlington & Quincy Railroad, 3.22 meters north of the center of the track, and 1 meter above the grade. (Note 54,* unstamped.)

U. S. R. S. 15.—About 3.4 miles east of *Ballantine, Yellowstone County, Mont.*, in the center of the coping of the crossing of Lateral H. C., and the Chicago, Burlington & Quincy Railroad, 3.22 meters north of the center of the track, and $\frac{1}{2}$ meter above grade. (Note 54,* unstamped.)

U. S. R. S. 16.—About 2.0 miles west of *Anita, Big Horn County, Mont.*, in the center of the coping of the crossing of the high-line canal, Huntley Project, and the Chicago, Burlington & Quincy Railroad, 13.40 meters south of the center of the track. (Note 54,* unstamped.)

U. S. G. S. 3056.—At *Anita, Big Horn County, Mont.*, opposite the station sign, 24.10 meters northeast of the center of the Chicago, Burlington & Quincy Railroad track, 1 meter outside of the right-of-way fence. (Note 18,* unstamped.)

F₇.—About 2.3 miles south of *Anita, Big Horn County, Mont.*, in the east end of the north abutment of the Chicago, Burlington & Quincy Railroad bridge 811.57, in the center of the concrete coping stone, 2.56 meters east of the center of the track. (Note 4.)*

G₇.—About 3.2 miles south of *Anita, Big Horn County, Mont.*, 23.90 meters east of the center of the Chicago, Burlington & Quincy Railroad track, $1\frac{1}{2}$ meters outside of the right-of-way fence, and 1 meter below the grade. (Note 2.)*

U. S. R. S. 3144.—At *Corinth, Big Horn County, Mont.*, 38.1 meters west of the center of the Chicago, Burlington & Quincy Railroad track, 12.2 meters west of the right-of-way fence, and 60.7 meters southwest of the southwest abutment of the water tank. (Note 18,* unstamped.)

U. S. G. S. 3303.—At *Toluca, Big Horn County, Mont.*, 40.6 meters south of the southeast corner of the railroad station, 40.38 meters southwest of the center of the Chicago, Burlington & Quincy main track, and 0.6 meter northeast of the right-of-way fence. (Note 18,* unstamped.)

H₇.—About 3.3 miles east of *Toluca, Big Horn County, Mont.*, in center of the concrete coping at the south end of the west abutment of bridge 794.23, 2.34 meters south of the center of the Chicago, Burlington & Quincy Railroad track. (Note 1.)*

I₇.—About 5.2 miles east of *Toluca, Big Horn County, Mont.*, opposite the west end of 1° curve, 21.4 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 1 meter south of the railroad right-of-way fence. (Note 11.)*

J₇.—About 2.6 miles west of *Hardin, Big Horn County, Mont.*, in the south end of the west abutment of girder bridge 787.40, 2.27 meters south of the center of the Chicago, Burlington & Quincy Railroad track, 41 centimeters from the iron pedestal of the bridge, and 39 centimeters from the face of the abutment. (Note 4,* stamped "U.S.B.M.")

U. S. G. S. 2989.—About 2.1 miles west of *Hardin, Big Horn County, Mont.*, at the east end of a 1° curve, and 335 meters west of the Fort Custer Canal, 21.84 meters north of the center of the Chicago, Burlington & Quincy Railroad track and 1 meter north of the right-of-way fence. (Note 18,* unstamped.) This bench mark was found to be loose, but not seriously disturbed, and was tamped solidly into place.

K₇.—At *Hardin, Big Horn County, Mont.*, 55.1 meters northwest of the northwest corner of the passenger station, 12.84 meters north of the center of the Chicago, Burlington & Quincy Railroad track, in the center of the south edge of the iron plate forming the column footing of the southwest pier of the water tank. The mark is the surface within a 1-inch outlined square, lettered "U.S.B.M."

* See pp. 162-166.

L₇.—About 1.7 miles east of *Hardin, Big Horn County, Mont.*, in the center of the south end of the concrete coping stone at the west end of the three-span steel-truss bridge of the Chicago, Burlington & Quincy Railroad over the Big Horn River. (Note 1.)*

M₇.—About 1.8 miles east of *Hardin, Big Horn County, Mont.*, in the center of the north end of the concrete coping stone at the east end of the three-span steel-truss bridge of the Chicago, Burlington & Quincy Railroad over the Big Horn River. (Note 1.)*

N₇.—About 2.1 miles east of *Hardin, Big Horn County, Mont.*, in the south coping of the Chicago, Burlington & Quincy Railroad bridge over the Little Big Horn River, 9.92 meters south of the center of the track and 4.20 meters from the west end of the coping. (Note 4.)* Probably destroyed.

O₇.—At *Dunmore, Big Horn County, Mont.*, opposite the section house, 23.2 meters east of the center of the Chicago, Burlington & Quincy Railroad track, 1 meter east of the railroad right-of-way fence. (Note 2.)*

P₇.—About 0.6 mile south of *Dunmore, Big Horn County, Mont.*, in the west end of the north abutment of a Chicago, Burlington & Quincy Railroad bridge, 2.20 meters west of the center of the track, 13 centimeters from the face of the wing wall, and 21 centimeters from the end of the wing wall. (Note 4.)*

Q₇.—About 2.1 miles south of *Dunmore, Big Horn County, Mont.*, in the coping at the east end of the north abutment of bridge 774.51 of the Chicago, Burlington & Quincy Railroad, 1.80 meters east of the center of the track and 33 centimeters from the face of the coping. (Note 1.)*

R₇.—At *Crow Agency, Big Horn County, Mont.*, opposite and in line with the southeast end of the railroad station, and 20.7 meters from it, 34.2 meters northeast of the center of the Chicago, Burlington & Quincy Railroad track. (Note 11.)*

S₇.—About 0.4 mile south of *Crow Agency, Big Horn County, Mont.*, in the west end of the south pier of the steel-truss bridge 770.63 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 4.32 meters west of the center of the track, and 67 centimeters from the west point of the pier. (Note 1.)*

T₇.—About 2.5 miles south of *Crow Agency, Big Horn County, Mont.*, in the west end of the north pier of the steel-truss bridge 768.62 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 3.83 meters west of the center of the track, and 41 centimeters from the west point of the pier. (Note 4.)*

U₇.—At *Garryowen, Big Horn County, Mont.*, opposite the section house, 33.3 meters east of the center of the Chicago, Burlington & Quincy Railroad track, and 1 meter west of the right-of-way fence. (Note 2.)*

V₇.—About 2.7 miles south of *Garryowen, Big Horn County, Mont.*, in the coping stone at the southwest corner of the steel-truss bridge 762.76 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 2.0 meters west of the center of the track and 25 centimeters from the north face of the coping. (Note 4.)*

W₇.—About 2.2 miles north of *Ionia, Big Horn County, Mont.*, in the coping at the southwest corner of the steel-truss bridge 756.90 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 2.0 meters west of the center of the track. (Note 1.)*

X₇.—At *Ionia, Big Horn County, Mont.*, opposite the section house, 24.1 meters west of the center of the Chicago, Burlington & Quincy Railroad track and 2 meters west of the right-of-way fence. (Note 11.)*

Y₇.—About 1.6 miles north of *Lodgegrass, Big Horn County, Mont.*, in the west end of the south abutment of a concrete culvert of the Chicago, Burlington & Quincy Railroad, 3 rails north of bridge 751.82, and 2.0 meters west of the center of the track. (Note 4.)*

Z₇.—At *Lodgegrass, Big Horn County, Mont.*, between the Chicago, Burlington & Quincy Railroad station and George Pease's Indian store, 20.8 meters west of the center of the railroad track, and 1 meter east of the right-of-way fence. (Note 11.)*

A₈.—About 0.4 mile south of *Lodgegrass, Big Horn County, Mont.*, in the concrete coping at the west end of the south abutment of steel-girder bridge 749.82 of the Chicago, Burlington & Quincy Railroad, 1.85 meters west of the center of the track. (Note 4.)*

B₈.—About 2.3 miles south of *Little Horn, Big Horn County, Mont.*, in the center of the coping at the west end of the south abutment of concrete culvert 744.39 of the Chicago, Burlington & Quincy Railroad, 2.4 meters west of the center of the track. (Note 4.)*

C₈.—About 3.6 miles north of *Wyola, Big Horn County, Mont.*, at the west end of the south abutment of steel-girder bridge 740.65 of the Chicago, Burlington & Quincy Railroad over the Little Big Horn River, 3.48 meters west of the center of the track, 28 centimeters from the face of the coping, and 1.32 meters from the point of the wing wall. (Note 4.)*

D₈.—At *Wyola, Big Horn County, Mont.*, in the northwest pier of the masonry foundation of the water tank, 4.37 meters west of the center of the Chicago, Burlington & Quincy Railroad track, 31.7 meters from the passenger station. (Note 15.)*

E₈.—At *Wyola, Big Horn County, Mont.*, opposite a point 2 rails south of the Chicago, Burlington & Quincy Railroad passenger station, 75.1 meters west of the center of the track, and 64.7 meters from the northwest corner of the station. (Note 2.)*

F₈.—About 1.4 miles north of *Aberdeen, Big Horn County, Mont.*, in the west end of the north abutment of the steel-girder bridge 732.31 of the Chicago, Burlington & Quincy Railroad, 2.50 meters west of the center of the track, 37 centimeters from the face of the coping, and 55 centimeters from the angle of the wing wall. (Note 1.)*

* See pp. 162-166.

G₈.—At *Aberdeen, Big Horn County, Mont.*, 500 feet south of the section house, in the center of the coping stone at the west end of the north abutment of steel-girder bridge 730.69 of the Chicago, Burlington & Quincy Railroad, 2.68 meters west of the center of the track. (Note 1.)*

H₈.—In *Montana*, 3.6 miles north of *Parkman, Sheridan County, Wyo.*, in the west end of the south abutment of concrete bridge 727.67 of the Chicago, Burlington & Quincy Railroad, 2.72 meters west of the center of the track. (Note 4.)*

U. S. G. S. 4292.—At *Parkman, Sheridan County, Wyo.*, in front of the post office and hotel, 57.5 meters east of the Chicago, Burlington & Quincy Railroad track, and 77 meters from the passenger depot. (Note 18,* stamped "4292 Sher.")

U. S. G. S. 4138.—At *Ohlman, Sheridan County, Wyo.*, at the south corner of the crossroads near the schoolhouse, 27 meters from the fence corner, and 175 meters southwest of the center of the Chicago, Burlington & Quincy Railroad track. (Note 18,* stamped "4138 Sher.")

U. S. G. S. 4011, Ranchester northwest base reference mark.—4.4 miles northwest of *Ranchester, Sheridan County, Wyo.*, 1300 feet west of the western extremity of the first tangent on the Chicago, Burlington & Quincy Railroad, west of Ranchester, 1670 feet west of mile pole 719, and 8.2 meters north of the center of the railroad track. (Note 18,* unstamped.)

U. S. G. S. 3788, Ranchester southeast base reference mark.—At *Ranchester, Sheridan County, Wyo.*, 5.83 meters south of Ranchester southeast base Δ . (See below.) (Note 18,* unstamped.)

Ranchester southeast base Δ (U. S. G. S.).—At *Ranchester, Sheridan County, Wyo.*, $\frac{1}{2}$ mile west of the Chicago, Burlington & Quincy Railroad passenger station, 100 meters east of a highway crossing and 6.29 meters south of the center of the track. The mark is a hole 25 millimeters square and 4 millimeters deep in the top of a post of soft red sandstone, 6 by 6 inches on the top, set with 3 inches above the ground, and marked "U. S. B. M. C. & G. S. 1908."

U. S. G. S. 3751.—At *Ranchester, Sheridan County, Wyo.*, at the northwest corner of Main and Payton Streets, 3.2 meters from the corner and 32.25 meters south of the schoolhouse. (Note 18,* stamped "3751 Sher.")

U. S. G. S. 3698.—About 3.0 miles east of *Ranchester, Sheridan County, Wyo.*, about 200 meters west of the crossing of the Sheridan highway over the Chicago, Burlington & Quincy Railroad, at a small road crossing, 7 meters west of the center of the road and 8.80 meters north of the center of the track. (Note 18,* stamped "3698 Sher.")

U. S. G. S. 3660.—About 0.8 mile northwest of *Monarch, Sheridan County, Wyo.*, at the southwest corner of the crossroads, 120 meters south of Bob Hay's ranch house, 45 meters west of Slater Creek, 13.90 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 15 meters south of the center of the crossroads. (Note 18,* stamped "3660 Sher.")

Z₃.—About 0.7 mile northwest of *Monarch, Sheridan County, Wyo.*, 400 feet east of Slater Creek, in the concrete head wall for an inverted siphon, the crossing for an irrigation ditch under the Chicago, Burlington & Quincy Railroad; in the northwest corner of the wall, and 3.60 meters south of the center of the track. (Note 4.)*

A₄.—At *Alger, Sheridan County, Wyo.*, in steel-girder bridge 707.74 of the Chicago, Burlington & Quincy Railroad over Tongue River, in the coping stone at the south end of the east abutment, 45 centimeters from the side and 80 centimeters from the end of the coping stone. (Note 1.)*

B₄.—About 2.4 miles north of *Dietz, Sheridan County, Wyo.*, in steel-girder bridge 705.47 of the Chicago, Burlington & Quincy Railroad over Goose Creek, in the west end of the north abutment, in the center of the coping stone. (Note 4.)*

U. S. G. S. 3682.—About 2.1 miles north of *Sheridan, Sheridan County, Wyo.*, opposite the north barracks of Fort McKenzie, 575 feet south of a whistle post, 7.7 meters west of the center of the Chicago, Burlington & Quincy Railroad track, at the edge of the roadway just outside of the right-of-way fence. (Note 18,* stamped "3682 Sher.")

C₄.—About 1.4 miles north of *Sheridan, Sheridan County, Wyo.*, in the center of the coping of the concrete wall of the inverted siphon for an irrigation ditch under the Chicago, Burlington & Quincy Railroad, 3.22 meters west of the track. (Note 4.)*

Astro.—At *Sheridan, Sheridan County, Wyo.*, at the northeast corner of Crook and Fourth Streets, 375 feet southeast of the Chicago, Burlington & Quincy Railroad station. The mark is a cross cut on the highest point, a little to the east of the center, of the capstone of a brick pier 16 by 20 inches, projecting 30 inches above the ground. In the center of the capstone is a copper disk marked "U. S. Geological Survey," and stamped with the approximate latitude and longitude of the point.

D₄.—At *Sheridan, Sheridan County, Wyo.*, at the northwest corner of Gould and Loucks Streets, at the southeast corner of the grounds of the Federal building, 5.1 meters from the street corner, and 1 meter from the inside line of each sidewalk. (Note 11.)*

U. S. G. S. 3738.—At *Sheridan, Sheridan County, Wyo.*, in the front (east side) of the City Hall, 5.0 meters from the edge of the street and 63 centimeters from the ground. (Note 17.)*

E₄.—At *Sheridan, Sheridan County, Wyo.*, at the southwest corner of West Burkitt and South Main Streets, in the grounds of the Sheridan County courthouse, in the east face of the concrete post, 5.65 meters from the corner of the curbing, 1.25 meters from the ground. (Note 1.)*

F₄.—At *Wakely, Sheridan County, Wyo.*, about $\frac{1}{4}$ mile east of mile pole 694, in the concrete wall of the channel for an irrigation ditch under the Chicago, Burlington & Quincy Railroad, in the north end of the east wall, 7.05 meters north of the center of the track, 15 centimeters from the inner surface, and 15 centimeters from the end of the wall. (Note 4.)*

* See pp. 162-166.

G₄.—At *Arno, Sheridan County, Wyo.*, about $\frac{1}{2}$ mile west of mile pole 687, opposite the section house, 44.8 meters north of the center of the Chicago, Burlington & Quincy Railroad track, and 1 meter south of the right-of-way fence. (Note 2.*)

H₄.—About 3.3 miles west of *Verona, Sheridan County, Wyo.*, about $\frac{1}{8}$ mile west of mile pole 683, in the concrete coping at the southwest corner of a concrete cattle way under the Chicago, Burlington & Quincy Railroad, 5.4 meters south of the track, 2.15 meters from the end of the coping, and 2 meters below grade. (Note 1.*)

I₄.—At *Verona, Sheridan County, Wyo.*, opposite the Chicago, Burlington & Quincy Railroad station, 27 meters north of the center of the track, and 1 meter south of the right-of-way fence. (Note 11.*)

J₄.—At *Ulm, Sheridan County, Wyo.*, opposite the first telegraph pole west of the Chicago, Burlington & Quincy Railroad station, and 53.6 meters north of the center of the track, 39.2 meters from the northwest corner of the station, and 1 meter south of the right-of-way fence. (Note 2.*)

K₄.—About 2.7 miles east of *Ulm, Sheridan County, Wyo.*, in a concrete cattle way under the Chicago, Burlington & Quincy Railroad, 3.85 meters north of the center of the track, 12 centimeters from the face and 80 centimeters from the end of the wall. (Note 4.*)

L₄.—About 3.2 miles west of *Clearmont, Sheridan County, Wyo.*, in a steel-girder bridge of the Chicago, Burlington & Quincy Railroad, in the center of the concrete coping stone, at the north end of the west abutment, and 2.61 meters north of the center of the track. (Note 1.*)

M₄.—At *Clearmont, Sheridan County, Wyo.*, in the west end of the center pier of the western water tank near the Chicago, Burlington & Quincy Railroad station, 37.96 meters north of the center of the main track, and 30 centimeters from the end of the pier. (Note 4.*)

N₄.—At *Clearmont, Sheridan County, Wyo.*, at the intersection of New York Street and Pennsylvania Avenue, 43.2 meters south of the center of the Chicago, Burlington & Quincy Railroad track, 21.7 meters northwest of the post office, and 1.4 meters north of the well building. (Note 11.*)

O₄.—At *Big Corral, 6.7 miles east of Clearmont, Sheridan County, Wyo.*, near the Big Corral ranch of the U-Cross outfit, about the middle of the siding of the Chicago, Burlington & Quincy Railroad, opposite the wagon scales on the road north of the track, 13.53 meters north of the center of the track, and 1 meter south of the right-of-way fence. (Note 2.*)

W₈.—At *Cadiz, Sheridan County, Wyo.* (See p. 225.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN GOFFS, CAL., AND ALBUQUERQUE, N. MEX., 1909.

L₅.—At *Goffs, San Bernardino County, Cal.* (See p. 202.)

M₅.—At *Goffs, San Bernardino County, Cal.* (See p. 202.)

I₆.—At *Rising, San Bernardino County, Cal.*, opposite the station sign, 4 poles west of mile pole 605 $\frac{1}{2}$, and 20.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

J₆.—About $1\frac{1}{2}$ miles east of *Homer, San Bernardino County, Cal.*, opposite the first pole west of mile pole 600, 17.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1.3 meters from the east post of a rail rack. (Note 2.*)

K₆.—At *Ibis, San Bernardino County, Cal.*, 33.33 meters south of the Atchison, Topeka & Santa Fe Railway station, 26.57 meters south of the center of the main track, and 23.17 meters west of a small storehouse belonging to a mining company. (Note 2.*)

L₆.—3 miles west of *Java, San Bernardino County, Cal.*, 2 poles east of mile pole 588, in the surface of the concrete retaining wall at the south end of the east abutment of bridge D588, 3.09 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 4.*) Probably moved by the Atchison, Topeka & Santa Fe Railway in 1911.

M₆.— $\frac{1}{2}$ mile west of *Java, San Bernardino County, Cal.*, near mile pole 585 $\frac{1}{2}$, 3.1 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and $4\frac{1}{2}$ rails east of bridge B586. (Note 2.*) Probably moved by the Atchison, Topeka & Santa Fe Railway in 1911.

N₆.—At *Hartoum, San Bernardino County, Cal.*, near the west switch, opposite a rail rack, and 12.32 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

O₆.—At *Needles, San Bernardino County, Cal.*, 58 meters south of the south track of the Atchison, Topeka & Santa Fe Railway, at the north front of the recreation hall for the railway employees, in the center line of a landing of the stone steps leading to the main entrance. The mark is a cross on an iron bolt, $\frac{1}{2}$ inch in diameter, set flush with the concrete and lettered "U. S. B. M."

P₆.—At *Needles, San Bernardino County, Cal.*, in the park west of the El Garces Hotel. This bench mark has been destroyed.

Q₆.—At *Needles, San Bernardino County, Cal.*, in the north face of the concrete column at the northeast corner of the El Garces Hotel, 1.04 meters above the sidewalk. (Note 1.*)

Needles Astro.—At *Needles, San Bernardino County, Cal.*, at the corner of Third and D Streets, in a wooden observing shed, 12 meters southeast of the Catholic Church. The mark is a bronze disk of the United States Geological Survey, stamped "496 NE," in the center of the top of a concrete observing pier, $1\frac{1}{2}$ by 2 feet, projecting 2 feet above the ground.

* See pp. 162-166.

Δ Bar.—At *Needles, San Bernardino County, Cal.*, 56 meters southwest of the southwest corner of the large stone and brick school building on a hill south of town, and on the summit of the west end of the hill. The mark is a cross on the top of a 1½-inch iron bar projecting several inches from the top of a concrete pier, 1 by 1½ feet, standing 2 feet above the ground. Probably destroyed.

R₆.—5 miles south of *Needles, San Bernardino County, Cal.*, 7 poles south of mile pole 573, in the coping stone at the northeast corner of masonry culvert C574, 5.07 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 4.)*

U. S. G. S. 473.—5 miles south of *Needles, San Bernardino County, Cal.*, 1.65 meters from mile pole 573 and 11.6 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18.)*

S₆.—5 miles south of *Needles, San Bernardino County, Cal.*, 1 pole south of mile pole 573, in the east end of the north abutment of bridge I573, 4.42 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 10 centimeters from the face of the coping. (Note 1.)*

T₆.—3 miles south of *Beal, San Bernardino County, Cal.*, 2 poles south of mile pole 569, in the west end of the north abutment of bridge E569, 5.58 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face, and 30 centimeters from the end of the coping. (Note 4.)*

U₆.—5 miles south of *Beal, San Bernardino County, Cal.*, 4½ poles south of mile pole 567, in the coping at the northeast corner of bridge C567 of the Atchison, Topeka & Santa Fe Railway, 4.34 meters east of the center of the track, and 53 centimeters from the face of the coping. (Note 4.)*

V₆.—About 5½ miles south of *Beal, San Bernardino County, Cal.*, in the coping stone at the northwest corner of the large steel cantilever bridge of the Atchison, Topeka & Santa Fe Railway over the Colorado River, 2.24 meters north of the center of the track, 2.78 meters from the north side and 50 centimeters from the east side of the coping stone. (Note 1.)*

U. S. G. S. 504.—At *Topock, Mohave County, Ariz.*, in the coping stone at the southeast corner of the large steel cantilever bridge of the Atchison, Topeka & Santa Fe Railway over the Colorado River, 1.65 meters south of the center of the track, 53 centimeters from the south edge, and 53 centimeters from the west edge of the coping stone. (Note 17.)*

Δ Topog.—At *Topock, Mohave County, Ariz.*, at the edge of the bluff overlooking the Colorado River, 68.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 10 meters from the edge of the bluff. The mark is a bronze disk set in the horizontal surface of natural rock.

A.—At *Topock, Mohave County, Ariz.*, opposite the passenger station, 4.3 meters west of a corral for loading cattle, 7.3 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 2.3 meters from a telegraph pole. (Note 11.)*

B.—About 2.3 miles east of *Topock, Mohave County, Ariz.*, at mile pole 563½, in the coping stone at the northeast corner of culvert bridge B564, and 4.45 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 4.)*

C.—3 miles east of *Topock, Mohave County, Ariz.*, 5 poles east of mile pole 563 in the coping stone at the northwest corner of steel-girder bridge C563 of the Atchison, Topeka & Santa Fe Railway, and 3.1 meters north of the center of the track. (Note 1.)*

D.—1 mile west of *Powell, Mohave County, Ariz.*, opposite mile pole 560, and 23.7 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.)*

U. S. G. S. 762.—At *Powell, Mohave County, Ariz.*, opposite the station sign, and 25 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18.)*

U. S. G. S. 1101.—At *Franconia, Mohave County, Ariz.*, 5.7 meters south of the section house, and 17.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18.)*

E.—About 2.2 miles east of *Franconia, Mohave County, Ariz.*, at the east end of a 3° curve in the coping at the northeast corner of culvert bridge B551, and 5.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 15.)*

F.—About 2.5 miles east of *Franconia, Mohave County, Ariz.*, in the north end of the east abutment of steel-girder bridge A551 of the Atchison, Topeka & Santa Fe Railway, 36 centimeters from the face, and 43 centimeters from the end of the wing wall. (Note 1.)*

G.—About 2.7 miles east of *Franconia, Mohave County, Ariz.*, at mile pole 550, in the north end of the west abutment of steel-girder bridge C550 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face, and 170 centimeters from the end of the wing wall. (Note 15.)*

H.—3 miles east of *Franconia, Mohave County, Ariz.*, in the north end of the east abutment of steel-girder bridge B550 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face, and 78 centimeters from the end of the wing wall. (Note 15.)*

I.—3 miles west of *Haviland, Mohave County, Ariz.*, 4 poles east of mile pole 549, in the north end of the west abutment of culvert bridge C549 of the Atchison, Topeka & Santa Fe Railway, 12 centimeters from the face, and 15 centimeters from the end of the coping. (Note 15.)*

J.—1 mile east of *Haviland, Mohave County, Ariz.*, 5½ poles west of mile pole 545, in the coping stone at the northwest corner of culvert bridge A546 of the Atchison, Topeka & Santa Fe Railway, 12 centimeters from the face, and 12 centimeters from the end of the coping. (Note 15.)*

* See pp. 162-166.

K.— $1\frac{1}{2}$ miles east of *Haviland, Mohave County, Ariz.*, in the north end of the west abutment of steel-girder bridge A545 over Dry Creek, 2.93 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 42 centimeters from the face of the abutment. (Note 1.*)

L.—About 2.3 miles east of *Haviland, Mohave County, Ariz.*, 8 poles east of mile pole 544, in the coping stone at the northeast corner of culvert bridge A544 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face, and 20 centimeters from the end of the coping. (Note 15.*)

M.—About 2.8 miles west of *Yucca, Mohave County, Ariz.*, in the south end of the east abutment of steel-girder bridge C543 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face, and 40 centimeters from the end of the abutment. (Note 4.*)

N.—About 1.8 miles west of *Yucca, Mohave County, Ariz.*, in the north end of the west abutment of bridge C542 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face, and 40 centimeters from the end of the abutment. (Note 15.*)

O.—1 mile west of *Yucca, Mohave County, Ariz.*, 5 poles west of mile pole 541, in the coping stone at the northeast corner of culvert bridge A542 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face, and 20 centimeters from the end of the coping. (Note 4.*)

P.—At *Yucca, Mohave County, Ariz.*, 300 meters east of the passenger station, 2 poles west of mile pole 540, in the coping stone at the northeast corner of culvert bridge A541 of the Atchison, Topeka & Santa Fe Railway, 23 centimeters from the face, and 24 centimeters from the end of the coping. (Note 4.*)

Q.— $\frac{1}{4}$ mile east of *Yucca, Mohave County, Ariz.*, $6\frac{1}{2}$ poles east of mile pole 540, in the north end of the east abutment of steel-girder bridge A540 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face, and 40 centimeters from the end of the coping. (Note 1.*)

R.—2 miles east of *Yucca, Mohave County, Ariz.*, 5 poles west of mile pole 538, in the coping at the northeast corner of concrete arch bridge A539 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face, and 14 centimeters from the end of the coping. (Note 15.*)

S.—About 1.2 miles west of *Kaster, Mohave County, Ariz.*, 12 poles west of mile pole 532, in the north end of the west abutment of steel-girder bridge A533 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 1.*)

T.—About 1.4 miles south of *Drake, Mohave County, Ariz.*, 17 poles north of mile pole 539, in the west end of the south abutment of steel-girder bridge B529 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 1.*)

U.—At *Drake, Mohave County, Ariz.*, 6 poles south of mile pole 527, 4 poles south of the section house and 19.4 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

V.—1 mile north of *Drake, Mohave County, Ariz.*, $1\frac{1}{2}$ poles south of mile pole 526, in the coping at the southwest corner of culvert bridge A527 of the Atchison, Topeka & Santa Fe Railway, 29 centimeters from the face and 32 centimeters from the end of the coping. (Note 4.*)

W.—About 2.4 miles north of *Drake, Mohave County, Ariz.*, 8 poles north of mile pole 525, in the coping stone at the west end of the north abutment of steel-girder bridge B525 of the Atchison, Topeka & Santa Fe Railway, 36 centimeters from the face, and 72 centimeters from the end of the coping. (Note 15.*)

X.—At *Hancock (Gold Flat post office), Mohave County, Ariz.*, $2\frac{1}{2}$ poles south of mile pole 524, in the coping at the northwest corner of culvert bridge A525 of the Atchison, Topeka & Santa Fe Railway, 16 centimeters from the face and 25 centimeters from the end of the coping. (Note 15.*)

Y.— $\frac{1}{2}$ mile south of *McConnico, Mohave County, Ariz.*, 17 poles south of mile pole 521, in the coping at the west end of the south abutment of steel-girder bridge A522 of the Atchison, Topeka & Santa Fe Railway, 29 centimeters from the face, and 32 centimeters from the end of the coping. (Note 4.*)

Z.—About 1.3 miles south of *Kingman, Mohave County, Ariz.*, $8\frac{1}{2}$ poles north of mile pole 518, in the coping at the center of the west side of culvert bridge C518 of the Atchison, Topeka & Santa Fe Railway, 18 centimeters from the face, and 196 centimeters from the north end of the coping. (Note 15.*)

A₁.—At *Kingman, Mohave County, Ariz.*, in the south wall of the Atchison, Topeka & Santa Fe Railway station, at the southeast corner of the ticket office, 1.25 meters from the ground and 20 centimeters from the edge of the wall. (Note 1.*)

B₁.—At *Kingman, Mohave County, Ariz.*, on the south side of South Front Street, 59.0 meters east of the east line of Fourth Street, opposite the Atchison, Topeka & Santa Fe Railway freight station, 2.9 meters from the fence line, and 4.2 meters from a telephone pole. (Note 11.*)

C₁.—At *Berry, Mohave County, Ariz.*, 15.9 meters south of station sign, 25.9 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter below grade. (Note 2.*)

D₁.—About 1.8 miles west of *Hualapai, Mohave County, Ariz.*, 4 poles west of mile pole 503, in the coping at the northwest corner of culvert bridge A504 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 15 centimeters from the end of the coping. (Note 4.*)

E₁.—At *Hualapai, Mohave County, Ariz.*, 1 pole west of mile pole 501 $\frac{1}{2}$, in the coping at the northeast corner of culvert bridge A502 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 20 centimeters from the end of the coping. (Note 1.*)

F₁.—At *Hualapai, Mohave County, Ariz.*, near the east switch, 26.8 meters east of the first pole east of mile pole 502, and 26.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

G₁.—About 1.3 miles east of *Hualapai, Mohave County, Ariz.*, near mile pole 500, in the coping at the northwest corner of culvert bridge A501 of the Atchison, Topeka & Santa Fe Railway, 5 centimeters from the face and 12 centimeters from the end of the coping. (Note 15.*)

H₁.—About 2.3 miles east of *Hualapai, Mohave County, Ariz.*, 2½ poles east of mile pole 499, in the north end of the west abutment of steel-girder bridge C499 of the Atchison, Topeka & Santa Fe Railway, 34 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 1.*)

I₁.—At *Antares, Mohave County, Ariz.*, 1 pole west of mile pole 495, in the coping at the northwest corner of culvert bridge A496 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face and 13 centimeters from the end of the coping. (Note 15.*)

J₁.—About 1.7 miles west of *Hackberry, Mohave County, Ariz.*, 10½ poles east of mile pole 491, in the coping stone at the southeast corner of culvert bridge C491 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 38 centimeters from the end of the coping. (Note 1.*)

K₁.—About 0.3 mile west of *Hackberry, Mohave County, Ariz.*, in the north end of the west abutment of steel-girder bridge A490 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 53 centimeters from the end of the coping stone. (Note 1.*)

L₁.—At *Hackberry, Mohave County, Ariz.*, in the southeast corner of the yard of the first house west of the railroad station, 0.8 meter from the corner post, 15.3 meters north of the center of track of the Atchison, Topeka & Santa Fe Railway, and 34.3 meters from the southwest corner of the railroad station. (Note 11.*)

M₁.—About 0.9 mile east of *Hackberry, Mohave County, Ariz.*, 3 poles west of mile pole 488, in the center of the coping at the north side of culvert bridge A489 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face of the coping. (Note 15.*)

N₁.—At *Tinnaka, Mohave County, Ariz.* (*Truxton post office*), at the Truxton Canyon Indian School, in the east wall of the masonry foundation of the main dormitory, 50 centimeters from the southeast corner and 87 centimeters from the ground. (Note 1.*)

O₁.—At *Crozier, Mohave County, Ariz.*, 10 poles west of mile pole 481, 7.5 meters east of the station sign, and 6.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

P₁.—About 1.9 miles east of *Crozier, Mohave County, Ariz.*, in the north end of the west abutment of steel-girder bridge D480 of the Atchison, Topeka & Santa Fe Railway, 41 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.*)

Q₁.—About ½ mile west of *Truxton (Siding), Mohave County, Ariz.*, 6 poles west of mile pole 478, in the north end of the west abutment of steel-girder bridge A479 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 20 centimeters from the end of the coping stone. (Note 15.*)

R₁.—About 1.4 miles east of *Cherokee, Mohave County, Ariz.*, 7 poles west of mile pole 470, in the north end of the west abutment of steel-girder bridge A471 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 52 centimeters from the end of the coping. (Note 4.*)

S₁.—About 2.3 miles west of *Peach Springs, Mohave County, Ariz.*, 6 poles west of mile pole 469, in the north end of the west abutment of steel-girder bridge B470 of the Atchison, Topeka & Santa Fe Railway, 42 centimeters from the face and 60 centimeters from the end of the coping. (Note 1.*)

T₁.—At *Peach Springs, Mohave County, Ariz.*, 5 poles east of mile pole 466, in the southwest corner of the orchard adjoining the railroad station, 1.4 meters from the corner post and 7.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 11.*)

U₁.—At *Nelson, Mohave County, Ariz.*, 4 poles west of mile pole 459, in the north end of the west abutment of steel-girder bridge A460 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 30 centimeters from the end of the coping. (Note 15.*)

V₁.—About 1.3 miles east of *Nelson, Mohave County, Ariz.*, near mile pole 458, in the north end of the west abutment of steel-girder bridge E458 of the Atchison, Topeka & Santa Fe Railway, 44 centimeters from the face and 75 centimeters from the end of the coping stone. (Note 1.*)

W₁.—About 2.1 miles west of *Yampai, Yavapai County, Ariz.*, at mile pole 454, in the coping at the northwest corner of culvert bridge B454 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face and 12 centimeters from the end of the coping. (Note 15.*)

X₁.—At *Yampai, Yavapai County, Ariz.*, 2 poles east of mile pole 452, 32 meters west of the section house and 19.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

Y₁.—About 2.9 miles east of *Yampai, Yavapai County, Ariz.*, at mile pole 449, in the coping at the northeast corner of culvert bridge A450 of the Atchison, Topeka & Santa Fe Railway, 12 centimeters from the face and 12 centimeters from the end of the coping. (Note 4.*)

Z₁.—About 2.2 miles east of *Pica, Yavapai County, Ariz.*, 4 poles east of mile pole 445, in the coping at the northwest corner of culvert bridge A445 of the Atchison, Topeka & Santa Fe Railway, 8 centimeters from the face and 15 centimeters from the end of the coping. (Note 15.*)

* See pp. 162-166.

A₂.—4 miles east of *Pica*, *Yavapai County, Ariz.*, 1½ poles west of mile pole 443, in the coping at the northeast corner of culvert bridge A444 of the Atchison, Topeka & Santa Fe Railway, 14 centimeters from the face and 15 centimeters from the end of the coping. (Note 4.)*

B₂.—About 1½ miles west of *Audley*, *Yavapai County, Ariz.*, at milepost 441, in the coping at the northwest corner of culvert bridge A441, of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face, and 18 centimeters from the end of the coping. (Note 4.)*

C₂.—At *Audley*, *Yavapai County, Ariz.*, 1½ poles west of mile pole 439, and 14.4 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.)*

D₂.—About 2.7 miles east of *Audley*, *Yavapai County, Ariz.*, 3½ poles east of mile pole 437, in the coping at the northwest corner of culvert bridge B437 of the Atchison, Topeka & Santa Fe Railway, 14 centimeters from the face and 18 centimeters from the end of the coping. (Note 15.)*

E₂.—About 1.7 miles west of *Chino*, *Yavapai County, Ariz.*, 2½ poles west of mile pole 434, in the coping at the northeast corner of culvert bridge A435 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 10 centimeters from the end of the coping. (Note 15.)*

F₂.—½ mile east of *Chino*, *Yavapai County, Ariz.*, 6 poles west of mile pole 432, in the coping at the northeast corner of culvert bridge Z433 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 10 centimeters from the end of the coping. (Note 15.)*

G₂.—1.2 miles west of *Seligman*, *Yavapai County, Ariz.*, in the north end of the abutment, at the west end of steel-trestle bridge A430 of the Atchison, Topeka & Santa Fe Railway, 28 centimeters from the face and 30 centimeters from the end of the coping stone. (Note 1.)*

H₂.—About 1.1 miles west of *Seligman*, *Yavapai County, Ariz.*, in the south end of the abutment at the east end of steel-trestle bridge A430 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 31 centimeters from the end of the coping stone. (Note 4.)*

I₂.—At *Seligman*, *Yavapai County, Ariz.*, in the southwest corner of the inclosure surrounding the Santa Fe reading room, 2.4 meters from the corner post and 10.2 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 11.)*

J₂.—About 0.7 mile west of *Pan*, *Yavapai County, Ariz.*, 7 poles west of mile pole 424, in the coping at the northeast corner of arch-culvert bridge A425 of the Atchison, Topeka & Santa Fe Railway, 26 centimeters from the face and 51 centimeters from the end of the coping. (Note 4.)*

K₂.—About 1.9 miles south of *Crookton*, *Yavapai County, Ariz.*, 5 poles north of mile pole 417, in the east end of the north abutment of T-rail bridge A418 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 20 centimeters from the end of the abutment. (Note 4.)*

L₂.—At *Gleed*, *Yavapai County, Ariz.*, 6 rails west of the east switch, 8.8 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 2 meters below grade. (Note 2.)*

M₂.—½ mile west of *Pineveta*, *Yavapai County, Ariz.*, 2½ poles west of mile pole 409½, over the center pier, in the center of the coping at the north side of culvert-arch bridge A410 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face of the coping. (Note 1.)*

N₂.—About 1.4 miles east of *Pineveta*, *Yavapai County, Ariz.*, 4 poles west of mile pole 407½, in the north end of the west abutment of steel-girder bridge A408 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 89 centimeters from the end of the coping stone. (Note 4.)*

O₂.—About 2.7 miles west of *Ash Fork*, *Yavapai County, Ariz.*, 8½ poles west of mile pole 404, in the north end of the west abutment of steel-girder bridge A405 of the Atchison, Topeka & Santa Fe Railway, 27 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 4.)*

P₂.—At *Ash Fork*, *Yavapai County, Ariz.*, on the south side of the Atchison, Topeka & Santa Fe Railway, in the north face of the Harvey House, in the north face of the seventh column from the west end, 47 centimeters from its west edge and 1.38 meters from the ground. (Note 1.)*

U. S. G. S. 5141.—At *Ash Fork*, *Yavapai County, Ariz.*, opposite the railroad freight station, 90 meters south of the main track of the Atchison, Topeka & Santa Fe Railway, and 1 meter from the fence corner at the intersection of Lewis Avenue and Third Street. (Note 18,* unstamped.)

U. S. G. S. 5134.—½ mile east of *Ash Fork*, *Yavapai County, Ariz.*, 5 poles west of mile pole 400½, in the south end of the east abutment of culvert bridge A401 of the Atchison, Topeka & Santa Fe Railway. (Note 17,* unstamped.)

U. S. G. S. 5446.—½ mile west of *Holmes*, *Coconino County, Ariz.*, 1.45 meters west of mile pole 397 and 12.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop 2 meters below grade. (Note 17,* unstamped.)

Q₂.—½ mile east of *Holmes*, *Coconino County, Ariz.*, opposite a point 25.5 meters west of mile pole 396 and 3.72 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop. (Note 4.)*

U. S. G. S. 5713.—About 2.9 miles west of *Fairview*, *Coconino County, Ariz.*, 2.3 meters west of mile pole 394 and 12.9 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1 meter above grade in a large rock. (Note 17,* unstamped.)

U. S. G. S. 5964.—At *Fairview*, *Coconino County, Ariz.*, 7 poles west of mile pole 391, 3 rails west of the station sign, 10.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 55 centimeters from the south end of a stone wall. (Note 18,* unstamped.)

R₂.—About 0.6 mile east of *Fairview, Coconino County, Ariz.*, 4 poles west of mile pole 490½, in the north end of the west abutment of steel I-beam bridge A391 of the Atchison, Topeka & Santa Fe Railway, 22 centimeters from the face and 13 centimeters from the end of the coping. (Note 4.)*

S₂.—About 1.2 miles east of *Fairview, Coconino County, Ariz.*, 2 poles east of mile pole 390, in the north end of the west abutment of steel-trestle bridge A390 of the Atchison, Topeka & Santa Fe Railway, 22 centimeters from the face and 46 centimeters from the end of the coping stone. (Note 15.)*

T₂.—About 2.2 miles east of *Fairview, Coconino County, Ariz.*, 2 poles east of mile pole 389, near the west end of Johnson Canyon Tunnel, in the north end of the west abutment of steel-trestle bridge C389 of the Atchison, Topeka & Santa Fe Railway, 25 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 4.)*

U₂.—About 1.6 miles west of *McLellan, Coconino County, Ariz.*, 11 rails east of mile pole 388, in the north end of the west abutment of steel-girder bridge D388 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 4.)*

V₂.—At *McLellan, Coconino County, Ariz.*, 1½ poles east of mile pole 386½, in the north end of the west abutment of steel-girder bridge A387 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.)*

U. S. G. S. 6568.—About 1.4 miles east of *McLellan, Coconino County, Ariz.*, 13.4 meters west of mile pole 385 and 11.8 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop ½ meter below grade. (Note 17,* unstamped.)

W₂.—About 0.6 mile west of *Supai, Coconino County, Ariz.*, 10 poles west of mile pole 382, in the north end of the west abutment of T-rail bridge B383 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 26 centimeters from the end of the abutment. (Note 4.)*

U. S. G. S. 6961.—At *Supai, Coconino County, Ariz.*, 1.0 meter from the fifth pole west of mile pole 581½ and 9.8 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 18,* unstamped.)

X₂.—About 0.7 mile west of *Williams, Coconino County, Ariz.*, 8 poles east of mile pole 379, in the north end of the east abutment of steel-girder bridge B379 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 4.)*

U. S. G. S. 6770.—At *Williams, Coconino County, Ariz.*, at the southeast corner of Second Street and Bill Williams Avenue, 2.7 meters from the northwest corner of the Grand Canyon Hotel. (Note 18.)*

Y₂.—At *Williams, Coconino County, Ariz.*, on the north side of the Atchison, Topeka & Santa Fe Railway, in the south side of the news stand of the Fray Marcos (Harvey) Hotel, 64 centimeters from the southeast corner and 1.48 meters from the ground. (Note 1.)*

Z₂.—2.4 miles east of *Williams, Coconino County, Ariz.*, 7 poles east of mile pole 376, in the north end of the west abutment of T-rail bridge A376 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 32 centimeters from the end of the abutment. (Note 4.)*

U. S. G. S. 6952.—About 3.2 miles east of *Williams, Coconino County, Ariz.*, 23.0 meters northwest of mile pole 375, 27.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 3.4 meters south of the right-of-way fence, in a natural rock, 1 meter below grade. (Note 17.)*

U. S. G. S. 6930.—About 4.2 mile east of *Williams, Coconino County, Ariz.*, 7 poles east of mile pole 374½, in the south end of the east abutment of steel-girder bridge A375 of the Atchison, Topeka & Santa Fe Railway, 53 centimeters from the face and 58 centimeters from the end of the coping stone. (Note 15.)*

U. S. G. S. 6953.—½ mile east of *Davern, Coconino County, Ariz.*, 6 poles east of mile pole 372, in the south end of the east abutment of steel-girder bridge B372 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 83 centimeters from the end of the coping stone. (Note 17.)*

U. S. G. S. 6869.—At *Chalender, Coconino County, Ariz.*, 3 poles north of mile pole 368, 42.6 meters northwest of the railroad station and 8.2 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a natural rock. (Note 17.)*

A₃.—About 0.8 mile south of *Chalender, Coconino County, Ariz.*, 12 poles north of mile pole 367, in the west end of the south abutment of steel-girder bridge A368 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 64 centimeters from the end of the abutment. (Note 15.)*

U. S. G. S. 6852.—2 miles east of *Chalender, Coconino County, Ariz.*, 3½ poles west of mile pole 366, in the north end of the east abutment of steel-girder bridge A367 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face, 65 centimeters from the end of the coping stone. (Note 17, stamped "6852-1907.") This mark has been moved from the north to the south end of the abutment.

B₃.—1 mile west of *Maine, Coconino County, Ariz.*, 7 poles west of mile pole 363½, in the north end of the west abutment of steel-girder bridge A364 of the Atchison, Topeka & Santa Fe Railway, 39 centimeters from the face and 80 centimeters from the end of the coping stone. (Note 4.)*

U. S. G. S. 7086.—At *Maine, Coconino County, Ariz.*, north of the railroad station, 34.0 meters west of mile pole 362½, 19.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop. (Note 17.)*

U. S. G. S. 7178.—2 miles east of *Maine, Coconino County, Ariz.*, 2 poles east of mile pole 360½, in the coping at the northeast corner of culvert bridge A361 of the Atchison, Topeka & Santa Fe Railway, 55 centimeters from the face and 25 centimeters from the end of the coping. (Note 17.)*

U. S. G. S. 7193.—About 0.6 mile east of *Arey, Coconino County, Ariz.*, 10.3 meters north of mile pole 358, 27.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1.5 meters south of the right-of-way fence, and 2 meters below grade, in a rock outcrop. (Note 17.)*

U. S. G. S. 7131.—About 0.3 mile east of *Bellemont, Coconino County, Ariz.*, 1 pole west of mile pole 356, in the north end of the east abutment of steel I-beam bridge A357 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 17.)*

C₃.—About 1.3 miles east of *Bellemont, Coconino County, Ariz.*, 1 pole east of mile pole 355, in the north end of the west abutment of steel I-beam bridge C355 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face and 93 centimeters from the end of the coping stone. (Note 1.)*

U. S. G. S. 7186.—About 3.3 miles south of *Bellemont, Coconino County, Ariz.*, 20 meters southwest of mile pole 353, 8.5 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway and 9.2 meters south of a telegraph pole. (Note 17.)*

U. S. G. S. 7273.—About 0.7 mile east of *Riordan, Coconino County, Ariz.*, 3 poles west of mile pole 350, in the south end of the west abutment of steel-girder bridge A351 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 35 centimeters from the end of the coping stone. (Note 17.)* This bench mark probably was moved in 1910.

U. S. G. S. 7091.—About 0.3 mile east of *Agassiz, Coconino County, Ariz.*, 6 meters west of the fifth pole west of mile pole 347, 10 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter above grade, in a rock outcrop. (Note 17.)*

D₃.—About 0.8 mile east of *Agassiz, Coconino County, Ariz.*, 7 poles west of mile pole 346½, in the north end of the east abutment of steel I-beam bridge D347 of the Atchison, Topeka & Santa Fe Railway, 42 centimeters from the face and 83 centimeters from the end of the coping stone. (Note 4.)*

U. S. G. S. 6907.—At *Flagstaff, Coconino County, Ariz.*, on La Roux Street, in the north end of the south stone window sill of the Citizens Bank Building, 4.75 meters south of the center of the main entrance, 16 centimeters from the edge of the sill and 12 centimeters above the sidewalk. (Note 17.)*

E₃.—At *Flagstaff, Coconino County, Ariz.*, in the south front of the Atchison, Topeka & Santa Fe Railway station, 38 centimeters from the east edge of the west door and 1.25 meters from the ground. (Note 1.)*

U. S. G. S. 6844.—About 2.1 miles east of *Flagstaff, Coconino County, Ariz.*, near mile pole 342, in the north end of the east abutment of steel I-beam bridge A343 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 60 centimeters from the end of the coping stone. The abutment is painted "U. S. B. M. 6844." (Note 15.)*

U. S. G. S. 6843.—About 3.1 miles east of *Flagstaff, Coconino County, Ariz.*, south of mile pole 341, 19.3 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 21.0 meters east of the pole painted "U. S. B. M. 6843." (Note 17.)*

F₃.—½ mile east of *Cosmino, Coconino County, Ariz.*, 42.5 meters southeast of mile pole 333, and 2.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a rock outcrop, 20 centimeters from its edge. (Note 1.)*

G₃.—At *Winona, Coconino County, Ariz.*, 2½ poles east of mile pole 329, 20.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 19.0 meters southeast of a telegraph pole, in a rock outcrop, ½ meter above grade. (Note 1.)*

H₃.—About 2.7 miles east of *Winona, Coconino County, Ariz.*, 9½ poles east of mile pole 326, in the north end of the west abutment of steel-girder bridge A326 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.)*

I₃.—About 0.7 mile east of *Angell, Coconino County, Ariz.*, 2½ poles west of mile pole 321, 3.04 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway and 13.7 meters from a telegraph pole, in a rock outcrop, 34 centimeters from its edge. (Note 1.)*

J₃.—About 0.5 mile west of *Hibbard, Coconino County, Ariz.*, 6 poles east of mile pole 318, in the north end of the west abutment of steel-trestle bridge A318 of the Atchison, Topeka & Santa Fe Railway over Canyon Padre, 26 centimeters from the face and 25 centimeters from the end of the coping stone. (Note 15.)*

K₃.—About 0.5 mile west of *Hibbard, Coconino County, Ariz.*, 10 poles west of mile pole 317½ in the north end of the east abutment of steel-trestle bridge A318 of the Atchison, Topeka & Santa Fe Railway over Canyon Padre, 51 centimeters from the end and 46 centimeters from the face of the abutment. (Note 1.)*

L₃.—About 1.3 miles east of *Hibbard, Coconino County, Ariz.*, 5 poles west of mile pole 316, in the south end of the west abutment of T-rail bridge A317 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 34 centimeters from the end of the abutment. (Note 4.)*

M₃.—About 3.4 miles west of *Canyon Diablo, Coconino County, Ariz.*, 2 poles west of mile pole 314, in the south end of the west abutment of steel I-beam bridge A315 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the abutment. (Note 15.)*

N₃.—About 0.7 mile west of *Canyon Diablo, Coconino County, Ariz.*, 6 poles east of mile pole 312½, in the north end of the west abutment of steel-trestle bridge A313 of the Atchison, Topeka & Santa Fe Railway over Canyon Diablo, 24 centimeters from the face and 31 centimeters from the end of the coping stone. (Note 4.)*

* See pp. 162-166.

O₃.—About 0.6 mile west of *Canyon Diablo, Coconino County, Ariz.*, 7 poles west of mile pole 312, in the north end of the east abutment of steel-trestle bridge A313 of the Atchison, Topeka & Santa Fe Railway over Canyon Diablo, 30 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

P₃.—About 1.9 miles west of *Sunshine, (Meteor post office), Coconino County, Ariz.*, 13.8 meters west of mile pole 308 and 14.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 2 meters below grade, in a rock outcrop. (Note 1.*)

Q₃.—About 1 mile west of *Sunshine, Coconino County, Ariz.*, 6 poles west of mile pole 307, in the north end of the west abutment of steel I-beam bridge A308 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 73 centimeters from the end of the coping stone. (Note 15.*)

R₃.—About 1.1 miles east of *Sunshine, Coconino County, Ariz.*, 2 poles west of mile pole 305, in the north end of the west abutment of steel I-beam bridge A306 of the Atchison, Topeka & Santa Fe Railway, 42 centimeters from the face and 62 centimeters from the end of the coping stone. (Note 4.*)

S₃.—About 3.1 miles east of *Sunshine, Coconino County, Ariz.*, 4 poles east of mile pole 303, in the north end of the west abutment of steel-girder bridge B303 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 45 centimeters from the end of the coping stone. (Note 15.*)

T₃.—About 1.6 miles west of *Dennison, Coconino County, Ariz.*, 29 meters southwest of mile pole 300, 13.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway and 14.6 meters east of a telegraph pole, in a rock outcrop. (Note 1.*)

U₃.—About 1.4 miles east of *Dennison, Coconino County, Ariz.*, 2½ poles west of mile pole 297, in the north end of the west abutment of steel I-beam bridge A298 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 75 centimeters from the end of the coping stone. (Note 4.*)

V₃.—About 4.7 miles west of *Winslow, Navajo County, Ariz.*, 1 pole east of mile pole 290½, in the south end of the west abutment of steel I-beam bridge A291 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 15.*)

W₃.—About 2.2 miles west of *Winslow, Navajo County, Ariz.*, 2 poles west of mile pole 288, in the north end of the west abutment of steel I-beam bridge A289 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 65 centimeters from the end of the coping stone. (Note 4.*)

X₃.—At *Winslow, Navajo County, Ariz.*, 7 poles east of mile pole 286, in the northeast corner of the yard of the railroad hospital, 6.8 meters south of the center of the south track of the Atchison, Topeka & Santa Fe Railway and 1.0 meter from the corner post of the fence. (Note 11.*) This mark was reported moved in 1910 to a location 11.79 meters south of that described above.

Y₃.—About 2.9 miles east of *Winslow, Navajo County, Ariz.*, 3½ poles east of mile pole 283, in the north end of the west abutment of steel-truss bridge A283 of the Atchison, Topeka & Santa Fe Railway over the Little Colorado River, 46 centimeters from the face and 1.22 meters from the end of the coping stone. (Note 1.*)

Z₃.—About 3.1 miles east of *Winslow, Navajo County, Ariz.*, 8½ poles west of mile pole 282½, in the north end of the east abutment of steel-truss bridge A283 of the Atchison, Topeka & Santa Fe Railway over the Little Colorado River, 53 centimeters from the face and 1.14 meters from the end of the coping stone. (Note 4.*)

A₄.—About 3 miles south of *Hobson, Navajo County, Ariz.*, 9½ poles north of mile pole 277, in the northwest pedestal of the foundation of a former water tank, 7.25 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the east face and 43 centimeters from the north face of the pedestal. (Note 4.*)

B₄.—About 2.9 miles east of *Hardy, Navajo County, Ariz.*, opposite mile pole 272, 31.1 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway and 0.9 meter south of the right-of-way fence. (Note 2.*)

C₄.—½ mile east of *Manila, Navajo County, Ariz.*, just east of mile pole 268½, in the north end of the west abutment of steel-girder bridge A269 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

D₄.—About 0.9 mile west of *Joseph City, Navajo County, Ariz. (St. Joseph post office)*, 6 poles east of mile pole 264½, in the north end of the west abutment of steel-girder bridge A265 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 4.*)

E₄.—About 1.4 miles east of *Joseph City, Navajo County, Ariz.*, 11.4 meters northwest of mile pole 262 and 22.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

F₄.—½ mile west of *Penzance, Navajo County, Ariz.*, 2 poles west of mile pole 259, in the north end of the west abutment of stone-arch bridge A260 of the Atchison, Topeka & Santa Fe Railway, in the first stone below the coping, 38 centimeters from the face and 25 centimeters from the end of the abutment. (Note 4.*)

G₄.—About 0.6 mile east of *Penzance, Navajo County, Ariz.*, 11.5 meters east of the second pole east of mile pole 258 and 14.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 11½ meters below grade, in a rock outcrop. (Note 1.*)

H₄.—About 2.7 miles west of *Holbrook, Navajo County, Ariz.*, 8 poles east of mile pole 256, in the north end of the west abutment of steel-girder bridge A256 of the Atchison, Topeka & Santa Fe Railway, in the first stone below the coping, 32 centimeters from the face and 57 centimeters from the end of the abutment. (Note 4.*)

I₄.—At *Holbrook, Navajo County, Ariz.*, in the north face of the Atchison, Topeka & Santa Fe Railway station, 54 centimeters from the northwest corner of the building and 1.56 meters from the ground. (Note 1.*)

J₄.—3 miles east of *Holbrook, Navajo County, Ariz.*, 41.3 meters south of mile pole 250 and 8.0 meters southeast of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1 meter below grade, in a rock outcrop. (Note 1.*)

K₄.—About 1.5 miles west of *Aztec, Navajo County, Ariz.*, 16.5 meters north of mile pole 247, 28.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 0.9 meter south of the right-of-way fence, 1½ meters below grade. (Note 2.)*

L₄.—About 3.2 miles east of *Aztec, Navajo County, Ariz.*, 4½ poles east of mile pole 242½, in the north end of the west abutment of steel-girder bridge A243 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 28 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.)*

M₄.—About 4 miles east of *Aztec, Navajo County, Ariz.*, 5½ poles west of mile pole 241½, in the center of the south coping of culvert bridge B242 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 1.20 meters from the east end of the coping. (Note 15.)*

N₄.—1 mile west of *Carrizo, Navajo County, Ariz.*, 3 poles east of mile pole 239½, in the north end of the west abutment of steel-girder bridge A240 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 32 centimeters from the face and 58 centimeters from the end of the coping stone. (Note 1.)*

O₄.—About 1.7 miles west of *Adamana, Apache County, Ariz.*, 3 poles east of mile pole 234½, in the center of the south coping of culvert bridge A235 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 1.25 meters from the east end of the coping. (Note 4.)*

P₄.—At *Adamana, Apache County, Ariz.*, opposite the Atchison, Topeka & Santa Fe Railway station, 29.8 meters south of the center of the track and 0.9 meter north of the right-of-way fence. (Note 11.)*

Q₄.—2 miles east of *Adamana, Apache County, Ariz.*, 11 poles east of mile pole 231, in the north end of the west abutment of steel-girder bridge A231 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 4.)*

R₄.—3 miles west of *Pinta, Apache County, Ariz.*, 5.0 meters north of mile pole 222, 20.5 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway and 1½ meters below grade. (Note 2.)*

S₄.—About 1.7 miles west of *Pinta, Apache County, Ariz.*, 30 meters east of mile pole 221, in the center of the north coping of culvert bridge B221 of the Atchison, Topeka & Santa Fe Railway, 7 centimeters from the face and 1.60 meters from the east end of the coping. (Note 15.)*

T₄.—1 mile east of *Pinta, Apache County, Ariz.*, 12½ poles west of mile pole 218, in the coping at the northwest corner of stone-arch bridge A219 of the Atchison, Topeka & Santa Fe Railway, 19 centimeters from the face and 40 centimeters from the end of the coping. (Note 4.)*

U₄.—3 miles east of *Pinta, Apache County, Ariz.*, 10 poles east of mile pole 216½, in the north end of the west abutment of steel-girder bridge A217 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 20 centimeters from the face and 60 centimeters from the end of the abutment. (Note 1.)*

V₄.—About 3.3 miles west of *Navajo, Apache County, Ariz.*, ½ pole east of mile pole 216, in the coping at the southwest corner of stone-arch bridge A216 of the Atchison, Topeka & Santa Fe Railway, 15 centimeters from the face and 10 centimeters from the end of the coping. (Note 4.)*

W₄.—2 miles west of *Navajo, Apache County, Ariz.*, 9 poles east of mile pole 215, in the north end of the west abutment of steel-girder bridge A215 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 30 centimeters from the face and 35 centimeters from the end of the coping stone. (Note 15.)*

X₄.—About 2.8 miles east of *Navajo, Apache County, Ariz.*, 60 meters east of mile pole 210, in the north end of the west abutment of steel-girder bridge A210 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 30 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 1.)*

Y₄.—About 1.2 miles west of *Chambers, Apache County, Ariz.*, 4 poles west of mile pole 207, in the north end of the west abutment of steel-girder bridge A208 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 4.)*

Z₄.—At *Chambers, Apache County, Ariz.*, 23.5 meters east of the Atchison, Topeka & Santa Fe Railway station, 14.6 meters south of the center of the track, and 1½ meters below grade. (Note 2.)*

A₅.—1 mile west of *Sanders, Apache County, Ariz.*, 30 meters west of mile pole 201, in the north end of the west abutment of steel I-beam bridge A202 of the Atchison, Topeka & Santa Fe Railway, 34 centimeters from the face and 80 centimeters from the end of the coping stone. (Note 4.)*

B₅.—At *Sanders, Apache County, Ariz.*, 2½ poles east of mile pole 200, in the center of the south coping of stone-arch bridge B200 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 3.03 meters from the west end of the coping. (Note 4.)*

C₅.—About 1.2 miles east of *Sanders, Apache County, Ariz.*, 6½ poles west of mile pole 198, in the center of the north coping of stone-arch bridge A199 of the Atchison, Topeka & Santa Fe Railway, 28 centimeters from the face and 5.0 meters from the east end of the coping. (Note 15.)*

D₅.—About 1.7 miles west of *Houck, Apache County, Ariz.*, 5½ poles east of mile pole 194, in the north end of the east abutment of steel-girder bridge B194 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face and 1.10 meters from the end of the coping stone. (Note 15.)*

E₅.—About 1 mile west of *Houck, Apache County, Ariz.*, 6 poles west of mile pole 193, in the north end of the west abutment of steel-truss bridge A194 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 30 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 4.)*

* See pp. 162-166.

F₅.—At *Houck, Apache County, Ariz.*, 12 poles west of mile pole 192, in the south end of the west abutment of steel-truss bridge A193 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 35 centimeters from the face and 45 centimeters from the end of the coping stone. (Note 1.*)

G₅.—About 2.1 miles east of *Allantown, Apache County, Ariz.*, 5 poles west of mile pole 185, in the north end of the west abutment of T-rail bridge A186 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 40 centimeters from the end of the abutment. (Note 4.*)

H₅.—About 1.4 miles west of *Lupton, Apache County, Ariz.*, 2 poles east of mile pole 182, in the north end of the west abutment of steel-girder bridge B182 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 84 centimeters from the end of the coping stone. (Note 1.*)

I₅.—About 0.3 mile west of *Lupton, Apache County, Ariz.*, 3 poles east of mile pole 181, in the north end of the west abutment of steel-girder bridge A181 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 15.*)

A.—About 2.3 miles west of *Manuelito, McKinley County, N. Mex.*, 11 poles east of mile pole 178, in the north end of the west abutment of steel-girder bridge A178 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 75 centimeters from the end of the coping stone. (Note 4.*)

B.—About 0.3 mile west of *Manuelito, McKinley County, N. Mex.*, 5 poles west of mile pole 174½ in the north end of the west abutment of steel-girder bridge A175 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 25 centimeters from the end of the coping stone. (Note 1.*)

C.—About 0.4 mile east of *Manuelito, McKinley County, N. Mex.*, 1 pole west of mile pole 173, in the north end of the west abutment of steel-girder bridge A174 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 4.*)

D.—About 4.2 miles east of *Manuelito, McKinley County, N. Mex.*, 6 poles west of mile pole 170, in the north end of the west abutment of steel-girder bridge A171 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 40 centimeters from the face and 43 centimeters from the end of the coping stone. (Note 15.*)

E.—About 0.8 mile west of *Defiance, McKinley County, N. Mex.*, 5 poles east of mile pole 167, in the north end of the west abutment of steel-girder bridge B167 of the Atchison, Topeka & Santa Fe Railway, 32 centimeters from the face and 41 centimeters from the end of the coping stone. (Note 1.*)

F.—About 0.8 mile east of *West Yard, McKinley County, N. Mex.*, 11 poles west of mile pole 161, in the coping at the northwest corner of stone-arch bridge A162 of the Atchison, Topeka & Santa Fe Railway, 10 centimeters from the face and 31 centimeters from the end of the coping. (Note 15.*)

G.—At *Gallup, McKinley County, N. Mex.*, 10½ poles east of mile pole 158, at the southeast corner of the intersection of Railroad Avenue and Second Street, 19 meters south of the center of the south track of the Atchison, Topeka & Santa Fe Railway, 1.6 meters east of a telephone pole. (Note 11.*)

H.—About 1.9 miles east of *Gallup, McKinley County, N. Mex.*, 1 pole east of mile pole 156, in the north end of the west abutment of steel-girder bridge D156 of the Atchison, Topeka & Santa Fe Railway, 43 centimeters from the face and 44 centimeters from the end of the coping stone. (Note 1.*)

I.—About 2.8 miles east of *Gallup, McKinley County, N. Mex.*, 1 pole east of mile pole 154½, in the north end of the west abutment of steel-girder bridge A155 of the Atchison, Topeka & Santa Fe Railway, 37 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 15.*)

J.—About 1.8 mile west of *Zuni, McKinley County, N. Mex.*, 3½ poles east of mile pole 153½, in the north end of the west abutment of steel-girder bridge A154 of the Atchison, Topeka & Santa Fe Railway, 41 centimeters from the face and 67 centimeters from the end of the coping stone. (Note 4.*)

K.—About 1.2 miles east of *Zuni, McKinley County, N. Mex.*, 1½ poles east of mile pole 150½, in the north end of the west abutment of steel-girder bridge B151 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 38 centimeters from the face and 53 centimeters from the end of the coping stone. (Note 4.*)

L.—At *Wingate, McKinley County, N. Mex.*, opposite the Atchison, Topeka & Santa Fe Railway station, 27.5 meters south of the center of the track and 5.0 meters east of a telegraph pole. (Note 2.*)

M.—About 3.6 miles east of *Perea, McKinley County, N. Mex.*, 5½ poles west of mile pole 138, in the north end of the west abutment of steel-girder bridge A139 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 4.*)

N.—At *Guam, McKinley County, N. Mex.*, 5 poles west of mile pole 136, 31.8 meters east of the Atchison, Topeka & Santa Fe Railway station, opposite the station sign and 10.25 meters north of the center of the track. (Note 11.*)

O.—3 miles east of *Guam, McKinley County, N. Mex.*, opposite mile pole 133, 24.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter below grade. (Note 2.*)

P.—About 1.7 miles west of *Gonzales, McKinley County, N. Mex.*, 4 poles east of mile pole 132, in the coping at the southwest corner of stone-arch bridge B132 of the Atchison, Topeka & Santa Fe Railway, 21 centimeters from the face and 17 centimeters from the end of the coping. (Note 15.*)

Q.—At *Gonzales, McKinley County, N. Mex.*, 6 poles west of mile pole 130, 1.35 meters north of the south signboard reading: "Continental Divide Elevation 7248 Feet," and 14.0 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

R.—About 0.7 mile east of *Gonzales, McKinley County, N. Mex.*, 1 pole west of mile pole 129½, in the center of the north coping of stone-arch bridge B130 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 4.46 meters from the east end of the coping. (Note 4.*)

S.—At *Thoreau, McKinley County, N. Mex.*, 4 poles east of mile pole 125½, 7.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1.6 meters from the southeast corner of the store building of the McGaffey Co. (Note 11.*)

T.—About 1.5 miles east of *Thoreau, McKinley County, N. Mex.*, 7½ poles east of mile pole 124, in the north end of the west abutment of steel-girder bridge A124 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 55 centimeters from the end of the coping stone. (Note 1.*)

U.—1 mile east of *Chaves, McKinley County, N. Mex.*, 6.5 meters north of mile pole 121, and 18.2 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, at grade. (Note 2.*)

V.—1 mile west of *Baca, McKinley County, N. Mex.*, 4.8 meters north of mile pole 116, and 15.7 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 2 meters below grade. (Note 2.*)

W.—1 mile east of *Baca, McKinley County, N. Mex.*, 8.0 meters southwest of the fourth pole east of mile pole 114 and 4.70 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a limestone outcrop, 14 centimeters from the edge of the rock. (Note 4.*)

X.—2 miles east of *Baca, McKinley County, N. Mex.*, 7 poles east of mile pole 113, in the north end of the west abutment of steel I-beam bridge A113 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 39 centimeters from the end of the coping stone. (Note 15.*)

Y.—About 3.3 miles west of *Bluewater, Valencia County, N. Mex.*, 9 poles east of mile pole 111, in the north end of the west abutment of steel-girder bridge A111 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 36 centimeters from the end of the coping stone. (Note 1.*)

Z.—About 2.3 miles west of *Bluewater, Valencia County, N. Mex.*, opposite the tenth pole east of mile pole 110, and 15.3 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, ½ meter above grade. (Note 11.*)

A₁.—3 miles east of *Bluewater, Valencia County, N. Mex.*, 2 poles east of mile pole 104½, in the north end of the west abutment of steel-girder bridge A105 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 41 centimeters from the end of the coping stone. (Note 15.*)

B₁.—About 1.4 miles east of *Toltec, Valencia County, N. Mex.*, opposite mile pole 100, 29.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1.6 meters north of the right-of-way fence, 1 meter below grade. (Note 2.*)

C₁.—About 1.8 miles west of *Grants, Valencia County, N. Mex.*, 7 poles east of mile pole 98, in the north end of the west abutment of T-rail bridge D98 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 35 centimeters from the end of the abutment. (Note 4.*)

D₁.—At *Grants, Valencia County, N. Mex.*, 9½ poles east of mile pole 96½, 34.6 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the west wall of the store of the S. Bibb Mercantile Co., and 2.2 meters from the street corner. (Note 2.*)

E₁.—¼ mile east of *Grants, Valencia County, N. Mex.*, 24.3 meters northwest of the fourth pole east of mile pole 96, 30.3 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, on top of a rough stone post 6 inches square, projecting 15 inches above ground and marking the boundary of the railroad right of way. (Note 15.*)

F₁.—1 mile west of *Horace, Valencia County, N. Mex.*, 7 poles east of mile pole 91, in the center of the south coping of stone-arch bridge A91 of the Atchison, Topeka & Santa Fe Railway, 20 centimeters from the face and 4.80 meters from the east end of the coping. (Note 15.*)

G₁.—About 1.7 miles east of *Horace, Valencia County, N. Mex.*, 1½ poles west of mile pole 88, 2.85 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a sandstone outcrop, 20 centimeters from the edge of the rock. (Note 1.*)

H₁.—About 1.1 miles west of *McCartys, Valencia County, N. Mex.*, 5 poles east of mile pole 85, in the north end of the west abutment of steel-girder bridge D85 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 43 centimeters from the end of the coping stone. (Note 15.*)

I₁.—About 0.8 mile west of *McCartys, Valencia County, N. Mex.*, 1 pole west of mile pole 84½, in the coping at the northeast corner of culvert bridge B85 of the Atchison, Topeka & Santa Fe Railway, 11 centimeters from the face and 12 centimeters from the end of the coping. (Note 4.*)

J₁.—At *McCartys, Valencia County, N. Mex.*, 1 pole west of mile pole 83½, 5.33 meters east of a crossing warning sign, and 9.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

K₁.—About 0.9 mile west of *Alaska, Valencia County, N. Mex.*, 4 poles west of mile pole 79, in the north end of the west abutment of steel-girder bridge A80 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 1.*)

L₁.—About 3.5 miles east of *Alaska, Valencia County, N. Mex.*, 8 poles east of mile pole 75, in the north end of the west abutment of steel-girder bridge F75 of the Atchison, Topeka & Santa Fe Railway, 50 centimeters from the face and 1.53 meters from the end of the abutment. (Note 15.*)

M₁.—About 0.6 mile west of *Cubero, Valencia County, N. Mex.*, 14 poles east of mile pole 73, in the north end of the west abutment of steel-girder bridge C73 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 32 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 4.*)

N₁.—2 miles east of *Cubero, Valencia County, N. Mex.*, 4 poles west of mile pole 70, in the north end of the west abutment of steel-girder bridge A71 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 28 centimeters from the end and 53 centimeters from the face of the coping stone. (Note 15.*)

O₁.—2½ miles west of *Laguna, Valencia County, N. Mex.*, 3 poles west of mile pole 68½, in the north end of the west abutment of steel-girder bridge A69 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 44 centimeters from the face and 70 centimeters from the end of the coping stone. (Note 4.*)

P₁.—About 0.9 mile west of *Laguna, Valencia County, N. Mex.*, at mile pole 67, in the north end of the west abutment of steel-truss bridge D67 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 31 centimeters from the face and 50 centimeters from the end of the coping stone. (Note 1.*)

Q₁.—At *Laguna, Valencia County, N. Mex.*, 12.1 meters south of the Atchison, Topeka & Santa Fe Railway station, 5.8 meters east of the center of the track and 1.08 meters east of the fence line. (Note 11.*)

Laguna Astro.—At *Laguna, Valencia County, N. Mex.*, on a bluff overlooking the Rio San Jose, 139.4 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 69.5 meters east of the Gunn Bros.' grist mill, and 11.8 meters from the edge of the bluff, on the south side of the top of a stone post about 12 inches square, with a 1-inch drill hole in the center. (Note 15.*) Reported to be the location of a former longitude station.

R₁.—2 miles north of *Laguna, Valencia County, N. Mex.*, 3 poles south of mile pole 64, in the west end of the south abutment of steel-girder bridge A65 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 35 centimeters from the face and 52 centimeters from the end of the coping stone. (Note 15.*)

S₁.—About 3.1 miles north of *Laguna, Valencia County, N. Mex.*, at mile pole 63, in the west end of the south abutment of steel-truss bridge B63 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 31 centimeters from the face and 30 centimeters from the end of the coping stone. (Note 4.*)

T₁.—At *El Rito, Valencia County, N. Mex.*, opposite mile pole 60, 19.1 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 3.7 meters north of the right-of-way fence, 1 meter below grade. (Note 2.*)

U₁.—3 miles east of *El Rito, Valencia County, N. Mex.*, 7 poles west of mile pole 56½, in the north end of the west abutment of steel-girder bridge B57 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 48 centimeters from the end of the coping stone. (Note 1.*)

V₁.—About 2.3 miles west of *Armijo, Valencia County, N. Mex.*, 9 poles east of mile pole 56, in the north end of the west abutment of steel-girder bridge B56 of the Atchison, Topeka & Santa Fe Railway, 35 centimeters from the face and 40 centimeters from the end of the coping stone. (Note 15.*)

W₁.—About 1.8 miles east of *Armijo, Valencia County, N. Mex.*, 7 poles west of mile pole 51½, in the north end of the west abutment of steel-truss bridge B52 of the Atchison, Topeka & Santa Fe Railway over the Rio San Jose, 32 centimeters from the face and 42 centimeters from the end of the coping stone. (Note 4.*)

X₁.—About 2.6 miles east of *Armijo, Valencia County, N. Mex.*, 2½ poles east of mile pole 51, in the north end of the west abutment of T-rail bridge B51 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 22 centimeters from the end of the abutment. (Note 15.*)

Y₁.—At *Suwanee, Valencia County, N. Mex.*, 6.9 meters south of mile pole 47, and 24.7 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

Z₁.—About 3.6 miles east of *Suwanee, Valencia County, N. Mex.*, 25.3 meters east of the fifth pole west of mile pole 43½, 4.0 meters northeast of the center of the track of the Atchison, Topeka & Santa Fe Railway, in a limestone outcrop, at grade. (Note 1.*)

A₂.—1 mile west of *Garcia, Valencia County, N. Mex.*, 5 poles west of mile pole 42, in the north end of the west abutment of steel-girder bridge A43 of the Atchison, Topeka & Santa Fe Railway, 31 centimeters from the face and 42 centimeters from the end of the coping stone. (Note 4.*)

B₂.—1 mile south of *Garcia, Valencia County, N. Mex.*, 8.2 meters west of mile pole 40, 25.2 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 1 meter below grade. (Note 2.*)

C₂.—2 miles east of *Garcia, Valencia County, N. Mex.*, 7 poles east of mile pole 39, in the north end of the west abutment of steel I-beam bridge A39 of the Atchison, Topeka & Santa Fe Railway, 45 centimeters from the face and 60 centimeters from the end of the coping stone. (Note 15.*)

D₂.—2 miles west of *Rio Puerco, Valencia County, N. Mex.*, 3.2 meters south of mile pole 36, and 16.2 meters north of the center of the track of the Atchison, Topeka & Santa Fe Railway, 1 meter below grade. (Note 2.*)

E₂.—½ mile east of *Rio Puerco, Valencia County, N. Mex.*, 8 poles east of mile pole 34, in the north end of the west abutment of steel-truss bridge C34 of the Atchison, Topeka & Santa Fe Railway over the Rio Puerco, 35 centimeters from the face and 37 centimeters from the end of the coping stone. (Note 1.*)

F₂.—1 mile east of *Pavo, Valencia County, N. Mex.*, at mile pole 32, in the north end of the west abutment of steel I-beam bridge C32 of the Atchison, Topeka & Santa Fe Railway, 38 centimeters from the face and 39 centimeters from the end of the coping stone. (Note 4.*)

G₂.—3 miles east of *Pavo, Valencia County, N. Mex.*, 4 poles west of mile pole 30, in the north end of the west abutment of steel I-beam bridge A31 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 26 centimeters from the end of the coping stone. (Note 15.*)

* See pp. 162-166.

H₂.—3.5 miles east of *Pavo, Valencia County, N. Mex.*, 2½ poles west of mile pole 29½, in the north end of the west abutment of steel-girder bridge C30 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 80 centimeters from the end of the coping stone. (Note 1.*)

I₂.—About 1.5 miles west of *Sandia, Valencia County, N. Mex.*, 4.4 meters north of mile pole 25, and 9.2 meters south of the center of the track of the Atchison, Topeka & Santa Fe Railway. (Note 2.*)

J₂.—About 2.5 miles east of *Sandia, Valencia County, N. Mex.*, 3 poles east of mile pole 21, in the north end of the west abutment of steel I-beam bridge C21 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 30 centimeters from the end of the coping stone. (Note 15.*)

K₂.—About 1.2 miles west of *Manzana, Valencia County, N. Mex.*, 10½ poles west of mile pole 19, in the north end of the west abutment of steel-girder bridge B20 of the Atchison, Topeka & Santa Fe Railway, 33 centimeters from the face and 45 centimeters from the end of the coping stone. (Note 1.*)

L₂.—About 0.3 mile west of *Manzana, Valencia County, N. Mex.*, 3 poles east of mile pole 18½, in the north end of the west abutment of steel I-beam bridge A19 of the Atchison, Topeka & Santa Fe Railway, 40 centimeters from the face and 22 centimeters from the end of the coping stone. (Note 15.*)

M₂.—About 2.2 miles west of *Isleta, Bernalillo County, N. Mex.*, 2 poles east of mile pole 15, in the north end of the west abutment of steel-girder bridge A15 of the Atchison, Topeka & Santa Fe Railway, 30 centimeters from the face and 34 centimeters from the end of the coping stone. (Note 4.*)

U.S.G.S. 4891.—About 0.3 mile south of *Isleta, Bernalillo County, N. Mex.*, 2½ poles south of mile pole 13, 77 meters east of the center of the main line track of the Atchison, Topeka & Santa Fe Railway, 26.7 meters west of the center of the El Paso branch line track, 2 meters below grade of the latter, and 1.74 meters north of a stone post projecting 2 feet above ground. (Note 18,* unstamped.)

N₂.—At *Isleta, Bernalillo County, N. Mex.*, 13.1 meters east of the section foreman's house, 17.1 meters west of the center of the main line track of the Atchison, Topeka & Santa Fe Railway, and 28.7 meters north of the store of the Holmes Supply Co. (Note 11.*)

O₂.—2 miles north of *Isleta, Bernalillo County, N. Mex.*, 7 poles south of mile pole 913, in the west end of the south abutment of steel-girder bridge 818 of the Atchison, Topeka & Santa Fe Railway over the Rio Grande, 53 centimeters from the face and 38 centimeters from the end of the abutment. (Note 1.*)

U.S.G.S. 4902.—About 2.1 miles north of *Isleta, Bernalillo County, N. Mex.*, 2 poles south of mile pole 913, in the east end of the north abutment of steel-girder bridge 818 of the Atchison, Topeka & Santa Fe Railway over the Rio Grande, 50 centimeters from the face and 1.55 meters from the end of the abutment. (Note 5.*)

U. S. G. S. 4904.—About 3.2 miles north of *Isleta, Bernalillo County, N. Mex.*, 4 poles north of mile pole 912, 46 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 6.1 meters north of a Postal Telegraph pole, and 0.17 meters east of the railroad right-of-way fence, beside a highway. (Note 18,* stamped '11½.')

U. S. G. S. 4928.—7 miles south of *Albuquerque, Bernalillo County, N. Mex.*, 9 poles south of mile pole 909, 16.9 meters east of the center of the track of the Atchison, Topeka & Santa Fe Railway, 8 meters south of a road crossing, 1.17 meters east of the right-of-way fence, and 1.7 meters south of a Postal Telegraph pole. (Note 18,* stamped '8½.')

U. S. G. S. 4932.—About 3.2 miles south of *Albuquerque, Bernalillo County, N. Mex.*, 10½ poles south of mile pole 906, opposite a timber-treating plant of the railroad company, 15.5 meters west of the center of the track of the Atchison, Topeka & Santa Fe Railway, and 32 centimeters west of the right-of-way fence. (Note 18,* stamped '5½.')

P₂.—At *Albuquerque, Bernalillo County, N. Mex.*, in the east front of the Alvarado Hotel, in the concrete wall at the south side of the entrance to the lunch room, 12 centimeters from the edge of the wall, and 68 centimeters above the sidewalk. (Note 1.*)

U. S. G. S. 4954.—At *Albuquerque, Bernalillo County, N. Mex.*, at the corner of Central Avenue and First Street, at the northwest corner of the grounds of the Alvarado Hotel; between the sidewalk and the street, 60 centimeters from the curbing of First Street, and 5.30 meters from the curbing of Central Avenue. (Note 18,* unstamped.)

Albuquerque Astro.—At *Albuquerque, Bernalillo County, N. Mex.*, in the southeast corner of the grounds of the Albuquerque Public Library, 1 meter from the stone wall surrounding the grounds, 3.5 meters from the curbing on West Central Avenue, and 4.0 meters from the curbing on North Edith Street. The mark is a bronze disk, stamped "Lat. 35° 05' 01'', Long. 106° 38' 30'', set in a stone post, 8 inches square, which is lettered "Azimuth Station."

U. S. G. S. 4951.—At *Albuquerque, Bernalillo County, N. Mex.*, at the southwest corner of the intersection of South Second Street and Coal Avenue, near the west end of the viaduct across the railroad tracks, 30 centimeters from the curbing on Coal Avenue, and 4.7 meters from the curbing on Second Street. (Note 18,* unstamped.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN EL RENO, OKLA., AND JERICHO, TEX., 1909.

T. B. M., 142.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

B.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

1357 El Reno.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

City El Reno.—At *El Reno, Canadian County, Okla.* (See Report for 1903, p. 779.)

1327 Reno Junction.—At *Reno Junction, Canadian County, Okla.*, at the crossing of the Chicago, Rock Island & Pacific Railway and the (formerly so called) Choctaw, Oklahoma & Gulf Railway, 58.6 meters from the northeast intersection

* See pp. 162-166.

frog point measured southeasterly along the Chicago, Rock Island & Pacific Railway, 14.3 meters northeast of the center line of the tracks, and across a ditch from both railroads. (Note 18.*)

A₂.—At *Fort Reno, Canadian County, Okla.*, about $\frac{1}{2}$ mile southwest of the Chicago, Rock Island & Pacific Railway station, at the northwest corner of the Fort Reno settlement, on the southwest corner of the southwest stone base supporting one of the steel columns of the high steel water tank. (Note 5.*)

B₂.—At *Calumet, Canadian County, Okla.*, about 100 meters west of the Chicago, Rock Island & Pacific Railway station and 19 meters north of the center line of the main track, on the top of the north retaining wall of concrete which supports the roadway leading into the elevator of the Farmer's Grain Co. (Note 4.*)

C₂.—About $7\frac{1}{4}$ miles west of *Calumet, Canadian County, Okla.*, 180 feet west of small timber bridge No. 5305 of the Chicago, Rock Island & Pacific Railway, $1\frac{1}{4}$ poles west of pole 530-15, on the west line of the highway at the crossing, 13.5 meters south of the center line of the main track. (Note 2.*)

D₂.—At *Geary, Blaine County, Okla.*, 70 meters west of the west end of the Chicago, Rock Island & Pacific Railway station, near west end of the triangular plot on which the railroad water tank stands, and 4.9 meters north of the center line of the main track. (Note 11.*)

E₂.—At *Geary, Blaine County, Okla.*, on the low stone window sill on the west side of the north, or main, face of the Geary Opera House. (Note 5.*)

F₂.—At *Geary, Blaine County, Okla.*, on a projecting foundation stone at the northwest corner of the north, or main entrance to the Geary public-school building. (Note 5.*)

G₂.—At *Geary, Blaine County, Okla.*, on the east corner of the northeast concrete foundation supporting one of the steel columns of the city water tank. (Note 4.*)

H₂.—About $3\frac{1}{2}$ miles south of *Geary, Blaine County, Okla.*, 75 meters south of the south end of pile trestle No. 5385 of the Chicago, Rock Island & Pacific Railway, at the entrance to a cut, 15 meters west of the center line of the main track. (Note 2.*)

I₂.—About $7\frac{1}{4}$ miles southwest of *Geary, Blaine County, Okla.*, on the west end of the north concrete retaining wall supporting the embankment at the end of the steel bridge of the Chicago, Rock Island & Pacific Railway over South Canadian River. (Note 1.*)

J₂.—At *Bridgeport, Caddo County, Okla.*, about 240 meters east of the Chicago, Rock Island & Pacific Railway station, and 41.5 meters south of the center line of the main track, on the east property line of the extension of Main Street. (Note 2.*)

K₂.—About $2\frac{1}{2}$ miles west of *Bridgeport, Caddo County, Okla.*, 400 feet west of the west end of pile trestle No. 5459 of the Chicago, Rock Island & Pacific Railway, 550 feet west of a highway crossing, directly opposite mile pole 546, and 18 meters south of the center line of the main track. (Note 2.*)

L₂.—At *McCool, Caddo County, Okla.*, 180 meters east of the temporary station of the Chicago, Rock Island & Pacific Railway, 15.9 meters south of the center line of the main track, just outside the right of way at the southwest property corner at the highway crossing. (Note 2.*)

M₂.—About 2 miles east of *Hydro, Caddo County, Okla.*, on the south end of the west concrete pier of plate-girder bridge No. 5526 of the Chicago, Rock Island & Pacific Railway over Deer Creek. (Note 4.*)

N₂.—At *Hydro, Caddo County, Okla.*, on the southwest corner of the red sandstone building at the northeast corner of Main and Caddo Streets, occupied in 1909 by the post office; set horizontally facing Main Street, 0.3 meter above the concrete sidewalk. (Note 1.*)

O₂.—At *Hydro, Caddo County, Okla.*, 55 meters west of the west end of the Chicago, Rock Island & Pacific Railway station and 4 meters north of the center line of the main track, near west end of gravel platform of station. (Note 11.*)

P₂.—About 2.2 miles west of *Hydro, Caddo County, Okla.*, on the north end of the west concrete abutment of plate-girder bridge No. 5568 of the Chicago, Rock Island & Pacific Railway over Deer Creek. (Note 4.*)

Q₂.—About 2.8 miles east of *Weatherford, Custer County, Okla.*, 400 feet west of the west end of pile-trestle bridge No. 5599 of the Chicago, Rock Island & Pacific Railway, 14.3 meters south of the center line of the main track, and directly opposite mile pole 560. (Note 2.*)

R₂.—At *Weatherford, Custer County, Okla.*, 44.9 meters west of the west end of the depot and 6.9 meters north of the center line of the main track of the Chicago, Rock Island & Pacific Railway, near the Broadway crossing. (Note 11.*)

S₂.—At *Weatherford, Custer County, Okla.*, at the southwest corner of Broadway and Main Streets, 0.4 meter above the sidewalk, in the stone foundation of the brick building occupied in 1909 by the First National Bank of Weatherford. (Note 1.*)

T₂.—About 2.6 miles west of *Weatherford, Custer County, Okla.*, near the middle of the fourth curve west of Weatherford station, on the Chicago, Rock Island & Pacific Railway, 3.5 meters below the top of the rail, in the center of the north spandrel wall of a reinforced concrete culvert. (Note 4.*)

U₂.—About 3.4 miles west of *Weatherford, Custer County, Okla.*, on the south end of the east concrete abutment of plate-girder bridge No. 5662 of the Chicago, Rock Island & Pacific Railway. (Note 4.*)

V₂.—About 4.8 miles west of *Weatherford, Custer County, Okla.*, on top of a cut on the divide between South Canadian and Washita Rivers, $10\frac{1}{2}$ poles east of mile pole 568, 14 meters southwest of the center line of the main track, just inside the right of way of the Chicago, Rock Island & Pacific Railway. (Note 2.*)

W₂.—About 2 miles east of *Indianapolis, Custer County, Okla.*, 4 poles west of mile pole 571 on the Chicago, Rock Island & Pacific Railway, 13.4 meters south of the center line of the main track, on the west line of the north-and-south highway at the crossing on the curve. (Note 2.*)

X₂.—At *Indianapolis, Custer County, Okla.*, nearly opposite a large grain elevator, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 44 meters southeast of a point on the center line of the main track which is 33 meters northeast of the center of the temporary railroad station. (Note 2.)*

Y₂.—About 3.8 miles west of *Indianapolis, Custer County, Okla.*, 650 feet southwest of the Chicago, Rock Island & Pacific Railway pile trestle No. 5768 over Turtle Creek, 32 meters northwest of the center line of the main track, on the north line of the east-and-west highway at the crossing near mile pole 577. (Note 2.)*

Z₂.—About 1.4 miles northeast of *Clinton, Custer County, Okla.*, 0.5 mile east of the crossing of the Chicago, Rock Island & Pacific Railway and the St. Louis & San Francisco Railroad, on the south end of the bridge seat of the east concrete abutment of the one-span steel bridge of the former railway over Washita River. (Note 1.)*

A₃.—At *Clinton, Custer County, Okla.*, directly opposite the north end of the St. Louis & San Francisco Railroad passenger station, 8.4 meters east of the center line of the main track. (Note 11.)*

B₃.—At *Clinton, Custer County, Okla.*, at the southwest corner of Frisco Avenue and Fifth Street, in the first stone above the Frisco Avenue sidewalk, on the west end of the brick and stone building of C. G. Welch. (Note 1.)*

C₃.—At *Clinton, Custer County, Okla.*, near the corner of Choctaw Avenue and Sixth Street, on the west corner of the southwest concrete pier supporting one of the four steel columns of the city water tower. (Note 4.)*

D₃.—About 1 mile north of *Clinton, Custer County, Okla.*, on the face of the north concrete abutment of the plate-girder bridge, on which the Kansas City, Mexico & Orient Railway crosses the Chicago, Rock Island & Pacific Railway, 1 meter above the tracks of the latter railway and 2 meters from the east face of the abutment. (Note 4.)*

E₃.—About 3 miles west of *Clinton, Custer County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 12 meters north of the center line of the main track, 110 meters west of private road crossing at top of the grade. (Note 2.)*

F₃.—About 2 miles northeast of *Parkersburg, Custer County, Okla.*, on the southeast one of the stone supports for the columns of the railroad water tank. (Note 5.)*

G₃.—At *Parkersburg, Custer County, Okla.*, 135 meters west of temporary railroad station, 17 meters south of the center line of the main track of the Chicago, Rock Island & Pacific Railway, at the west end of a cut, on the edge of a swamp. (Note 2.)*

H₃.—About 5.7 miles west of *Parkersburg, Custer County, Okla.*, 1 pole east of mile pole 591, at Alfalfa spur of the Chicago, Rock Island & Pacific Railway, just inside the road line near the railroad property corner, near the north-and-south road crossing, and 14 meters south of the center line of the main track at the east-and-west road crossing. (Note 2.)*

I₃.—At *Foss, Washita County, Okla.*, about 100 meters east of the Chicago, Rock Island & Pacific Railway station, 8 meters south of the center line of the main track, 45 meters east of the Adams Street crossing, in front of the Foss Mill & Elevator Co.'s buildings. (Note 11.)*

J₃.—At *Foss, Washita County, Okla.*, at the northwest corner of Adams and Main Streets, slightly above the sidewalk on a projecting basement stone at the southwest corner of the brick building of the Foss Mercantile Co. (Note 5.)*

K₃.—At *Foss, Washita County, Okla.*, near the west end of the Chicago, Rock Island & Pacific Railway passenger station, on the northeast corner of the east one of the two stone piers nearest the track, which support the columns of the railroad water tank. (Note 5.)*

L₃.—About 3.7 miles west of *Foss, Washita County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 2 poles west of mile pole 598, at the west end of a cut on the third curve west of Foss, and 14 meters south of the center line of the main track. (Note 2.)*

M₃.—At *Canute, Washita County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, east of the section house, nearly opposite the east end of the railroad station, and 45 meters north of the center line of the main track. (Note 2.)*

N₃.—About 3.4 miles west of *Canute, Washita County, Okla.*, on the base of the southeast one of the four central stone piers supporting the wooden columns of the water tank belonging to the Chicago, Rock Island & Pacific Railway. (Note 5.)*

O₃.—About 1.6 miles east of *Elk City, Beckham County, Okla.*, near fence line on the east side of the road at a crossing 1 mile west of the Washita-Beckham County line road, 15 meters south of the center line of the main track of the Chicago, Rock Island & Pacific Railway. (Note 2.)*

P₃.—At *Elk City, Beckham County, Okla.*, on the right of way of the Chicago, Rock Island & Pacific Railway, 43.6 meters east of the east corner of the railroad station, and 17 meters southeast of the center line of the main track. (Note 11.)*

Q₃.—At *Elk City, Beckham County, Okla.*, at the southeast corner of Broadway and Main Streets, 0.7 meter above the sidewalk, in the water-table stone on the left side of the corner entrance to the Thurmond building, occupied by the First State Bank. (Note 1.)*

R₃.—At *Elk City, Beckham County, Okla.*, at the northwest corner of Jefferson and Broadway Streets, on the stone window sill near the sidewalk level on the south side of the building occupied by the German State Bank. (Note 5.)*

S₃.—About 5.0 miles southwest of *Elk City, Beckham County, Okla.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, at the northwest corner of the road crossing, at the highest point of the railroad between El Reno and Sayre, 14 meters north of the center line of the main track. (Note 2.)*

* See pp. 162-166.

- T₃.—At *Meritt, Beckham County, Okla.*, directly opposite the temporary station of the Chicago, Rock Island & Pacific Railway, 42 meters north of the center line of the main track, and just east of gate to private road. (Note 11.)*
- U₃.—At *Doxey, Beckham County, Okla.*, on the south side of one of the stone piers supporting the columns of the Chicago, Rock Island & Pacific Railway water tank. This pier is the west one of the second row from the track. (Note 5.)*
- V₃.—At *Doxey, Beckham County, Okla.*, 18.1 meters east of the east end of the Chicago, Rock Island & Pacific Railway station, and 10.7 meters north of the center line of the main track. (Note 2.)*
- W₃.—About 1.2 miles east of the Chicago, Rock Island & Pacific Railway station at *Sayre, Beckham County, Okla.*, 10.5 meters south of the center line of the main track, and on the east line of the north-and-south road at crossing. (Note 2.)*
- X₃.—About 0.7 mile east of the station at *Sayre, Beckham County, Okla.*, in the center of the top of the south spandrel wall of a small concrete culvert on the Chicago, Rock Island & Pacific Railway. (Note 4.)*
- Y₃.—At *Sayre, Beckham County, Okla.*, at the southwest corner of Main and Fourth Streets, 1 decimeter above the Main Street sidewalk, on the base stone near center of the north face of the Thurmond Block, the corner room of which is occupied by the First State Bank. (Note 1.)*
- Z₃.—At *Sayre, Beckham County, Okla.*, just west of the Chicago, Rock Island & Pacific Railway dining house, directly across from the coal chutes at the depot, 45 meters south of the center line of the main track, on the south fence line of an east-and-west road. (Note 11.)*
- A₄.—About 4.1 miles west of the Chicago, Rock Island & Pacific Railway station at *Sayre, Beckham County, Okla.*, 4 poles west of mile pole 631, near a private road crossing, at the west end of the first sizeable sandy cut west of Cane Mill Spur, 15 meters north of the center line of the track. (Note 2.)*
- B₄.—At *Hest Ranch, Beckham County, Okla.*, 45 meters north of the center line of the main track of the Chicago, Rock Island & Pacific Railway, and 115 meters west of the northwest property corner at the road crossing near the cotton gin. (Note 2.)*
- C₄.—About 2.0 miles east of *Erick, Beckham County, Okla.*, just inside the right of way at east end of a sandy cut on the Chicago, Rock Island & Pacific Railway, 1 pole west of mile pole 639, 14 meters north of the center line of the main track. (Note 2.)*
- D₄.—At *Erick, Beckham County, Okla.*, at the corner of Main and Broadway Streets, on the east face of the First State Bank building, in a base stone to the left of the corner entrance, 1 decimeter above the sidewalk. (Note 1.)*
- E₄.—At *Erick, Beckham County, Okla.*, 130 meters west of the ticket office in the Chicago, Rock Island & Pacific Railway station, 75 meters west of the Main Street crossing, 12.8 meters north of the center line of the main track in line with the telegraph poles. (Note 11.)*
- F₄.—About 2.6 miles west of *Erick, Beckham County, Okla.*, 14 meters north of the center line of the main track of the Chicago, Rock Island & Pacific Railway, just inside the right of way, at the northwest intersection at the highway crossing. (Note 2.)*
- G₄.—At *Texola, Beckham County, Okla.*, 650 feet east of the ticket office in the Chicago, Rock Island & Pacific Railway station, 315 feet east of the road crossing, 10.9 meters north of the center line of the main track, in line with the telegraph poles and just west of the section house. (Note 11.)*
- H₄.—At *Texola, Beckham County, Okla.*, on the east end of the concrete foundation of the Chicago, Rock Island & Pacific Railway station, 1.15 meters from the southeast corner of the building, 0.25 meter above the ground, and 1.2 meters below the top of the window sill. (Note 1.)*
- H₉.—At *Benonine, Wheeler County, Tex.*, on the right-of-way fence line of the Chicago, Rock Island & Pacific Railway, 12 meters north of the center line of the main track, just even with the signboard "Benonine," opposite the gates of the stock pens. (Note 2.)*
- I₉.—At *Fuller, Wheeler County, Tex.*, on the right of way of the Chicago, Rock Island & Pacific Railway, 24 meters north of the center line of the main track, just even with the signboard "Fuller," just east of the section house, and about 0.7 meter above the track. (Note 11.)*
- J₉.—About 3.8 miles east of *Shamrock, Wheeler County, Tex.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, 14.2 meters north of the center line of the main track, at the northwest property corner of the highway crossing near the signboard. (Note 2.)*
- K₉.—At *Shamrock, Wheeler County, Tex.*, nearly opposite the west end of the Chicago, Rock Island & Pacific Railway station, 26 meters south of the center line of the main track, 0.3 meter above the rails. (Note 11.)*
- L₉.—At *Shamrock, Wheeler County, Tex.*, at the northwest corner of Main and Second Streets, 1 decimeter above the sidewalk, in the base stone on the east side of the First National Bank Building. (Note 1.)*
- M₉.—About 3.5 miles west of *Shamrock, Wheeler County, Tex.*, at the top of the grade between Shamrock and Lela, on the Chicago, Rock Island & Pacific Railway, 1½ poles west of mile pole 668, 14.3 meters south of the center line of the main track near the line fence between the railroad right of way and an east-and-west highway. (Note 2.)*
- N₉.—At *Lela (formerly Story), Wheeler County, Tex.*, 72 meters west of the Chicago, Rock Island & Pacific Railway station, 12.2 meters north of the center line of the main track, and just west of the crossing signboard. (Note 11.)*
- O₉.—About 3.1 miles northeast of *Ramsdell, Wheeler County, Tex.*, just inside the right of way of the Chicago, Rock Island & Pacific Railway, on a small ridge near an abandoned road crossing, 2 poles northeast of pole 673-20, and 14 meters northwest of the center line of the main track. (Note 2.)*

P₉.—At *Ramsdell, Wheeler County, Tex.*, inside the right of way of the Chicago, Rock Island & Pacific Railway, in line with the east highway fence at the road crossing, 440 feet east of the ticket office in the railroad station, and 30 meters north of the center line of the main track. (Note 11.*)

Q₉.—At *Ramsdell, Wheeler County, Tex.*, on the west end of the concrete foundation of the Chicago, Rock Island & Pacific Railway station, 0.3 meter below the top and 0.6 meter from the northwest corner. (Note 1.*)

R₉.—About 6.0 miles west of *Ramsdell, Wheeler County, Tex.*, 2 poles east of pole 682-25, on the Chicago, Rock Island & Pacific Railway, 13.3 meters south of the center line of the main track, and about 0.25 meter east of the Wheeler-Gray County fence line. (Note 2.*)

S₉.—At *McLean, Gray County, Tex.*, on the east wall of the concrete foundation of the Chicago, Rock Island & Pacific Railway station, 0.3 meter below the top and 0.2 meter from the northeast corner. (Note 1.*)

T₉.—At *McLean, Gray County, Tex.*, at the northeast corner of Main and First Streets, on the building occupied by the Citizens State Bank of McLean. It is to the left of the entrance on the southwest corner, 1.4 meters above the sidewalk. (Note 1.*)

U₉.—About 3.9 miles southwest of *McLean, Gray County, Tex.*, inside the right of way at the southwest end of a cut on a curve on the Chicago, Rock Island & Pacific Railway, 2½ poles southwest of mile pole 691, 14.3 meters north-west of the center line of the main track. (Note 2.*)

V₉.—About 1.5 miles northeast of *Alanreed, Gray County, Tex.*, just outside the right of way at the south end of a cut on the Chicago, Rock Island & Pacific Railway, 2 poles north of pole 694-15, 16 meters east of the center line of the main track, and to the west of the highway. (Note 2.*)

W₉.—At *Alanreed, Gray County, Tex.*, 21.2 meters south of a point on the center line of the main track of the Chicago, Rock Island & Pacific Railway, which is 10.7 meters east of the railroad station, 1.2 meters above the main tracks, and just north of the highway. (Note 11.*)

X₉.—At *Alanreed, Gray County, Tex.*, at the northwest corner of Main Street and Second Avenue, on the brick building occupied by the Bank of Alanreed. It is on the southwest corner of the building, to the left of the entrance, and 0.3 meter above the sidewalk. (Note 1.*)

Y₉.—About 3.0 miles southwest of *Alanreed, Gray County, Tex.*, at the north end of the curve in the cut on the Chicago, Rock Island & Pacific Railway, ½ pole north of mile pole 699, 15 meters west of the center line of the main track, and just east of the public highway, which follows the divide. (Note 2.*)

Z₉.—At *Rockledge, Donley County, Tex.*, 60 meters south of the center line of the main track of the Chicago, Rock Island & Pacific Railway, even with and across the tracks from the signboard "Rockledge," at the north fence line of the highway which follows the divide. (Note 2.*)

A₁₀.—About 3.5 miles east of *Jericho, Donley County, Tex.*, just outside the right of way near the west end of the curve at the top of the grade on the Chicago, Rock Island & Pacific Railway, 1 pole east of pole 704-15, 15 meters south of the center line of the main track, and about 40 meters north of the highway which follows the divide. (Note 2.*)

B₁₀.—At *Jericho, Donley County, Tex.*, on the right-of-way property line of the Chicago, Rock Island & Pacific Railway, 60 meters west of the railroad station, 29.7 meters south of the center line of the main track. (Note 11.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN FORT WORTH AND EL PASO, TEX., 1910.

T.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 782.)

U.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 783.)

V.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 783.)

M₈.—At *Fort Worth, Tarrant County, Tex.* (See Report for 1903, p. 787.)

C₁₀.—At *Fort Worth, Tarrant County, Tex.*, on the Hill Street concrete viaduct, over the Texas & Pacific and the Frisco Line railway tracks, 1.1 miles west of the Union Passenger station, on the east face of the north side of the arch over the main-line track of the Texas & Pacific Railway, 1.45 meters above the ground and 0.36 meter from the south edge of the face of the arch. (Note 1.*)

D₁₀.—2.1 miles west of *Fort Worth, Tarrant County, Tex.*, on the highway bridge carrying the Fort Worth and Weatherford road over the Clear Fork of the Trinity River, on the top of the south wing wall of the east concrete abutment, about 0.20 meter from the footplate of the truss. This bridge is about 35 meters north of the Texas & Pacific Railway bridge 249-A over the same stream. (Note 1.*)

E₁₀.—About 4.5 miles west of *Fort Worth, Tarrant County, Tex.*, and midway between the Texas & Pacific Railway track and the center of the Fort Worth and Weatherford highway, 0.5 meter inside and south of the railroad's right-of-way fence and 1.5 meters inside and east of the fence of the first byroad that crosses the track west of the siding for the Fort Worth waterworks pumping station. (Note 2.*)

F₁₀.—About 1.4 miles east of *Benbrook, Tarrant County, Tex.*, on the middle pier of the Texas & Pacific Railway plate-girder bridge 254-C over Marys Creek, on the top of the coping of the north end of the pier, and approximately in the center of the stone. (Note 5.*)

G₁₀.—At *Benbrook, Tarrant County, Tex.*, on land belonging to Mr. C. W. Carpenter, at the turn of the Fort Worth and Weatherford highway, just across the road and south of the Texas & Pacific Railway stock pens, about 50 meters south of the main-line track, and 0.75 meter south and 0.75 meter west of the highway fence. (Note 11.*)

H₁₀.—About 2.8 miles west of *Benbrook, Tarrant County, Tex.*, on the Texas & Pacific Railway plate-girder bridge 258-B over Walnut Creek, on top of the north end of the east masonry abutment. (Note 1.*)

I₁₀.—At *Iona, Parker County, Tex.*, about 130 meters west of the section house, 15 meters south of the west end of the siding, and 1 meter north of the fence between the railroad right of way and the county road. (Note 2.*)

J₁₀.—At *Aledo, Parker County, Tex.*, on land belonging to Mr. J. J. Sears and in use as a public park, about midway of the south side of the park, and 1 meter north of the boundary fence. (Note 11.*)

K₁₀.—At *Aledo, Parker County, Tex.*, on the west side of the entrance of the stone building owned by Mr. J. J. Sears, and occupied by his general merchandise store, and 2 meters above the sidewalk. (Note 1.*)

L₁₀.—About 1.7 miles west of *Aledo, Parker County, Tex.*, on the Texas & Pacific Railway bridge 266C over Clear Creek, on top of the highest course of the east masonry abutment, and in line with the west girder. (Note 4.*)

M₁₀.—About 2.8 miles west of *Aledo, Parker County, Tex.*, on the Texas & Pacific Railway bridge 267C over the Clear Fork of the Trinity River, on the top of the eastern abutment, and in line with the south girder. (Note 16.*)

N₁₀.—About 0.4 mile west of *Annetta, Parker County, Tex.*, on the Texas & Pacific Railway bridge 270B over Burgess Creek, on the stone coping, at the northern end of the eastern abutment, and on a level with the bottom of the girder. (Note 16.*)

O₁₀.—About 0.5 mile east of *Earls, Parker County, Tex.*, on Texas & Pacific Railway bridge 273A over the Clear Fork of the Trinity River on top of the northern end of the western abutment. (Note 16.*)

P₁₀.—At *Earls, Parker County, Tex.*, on the Texas & Pacific Railway right of way, midway of a switch, and 1 meter north of the south fence. (Note 2.*)

Q₁₀.—About 2.5 miles east of *Weatherford, Parker County, Tex.*, on the Texas & Pacific Railway bridge 275B over the Clear Fork of the Trinity River, on the south end of the east abutment, 0.2 meter from the corner of the stone, and 6 meters from the center of the track. (Note 4.*)

R₁₀.—At *Weatherford, Parker County, Tex.*, 0.6 mile east of the Texas & Pacific Railway depot, on the Texas & Pacific Railway bridge 277-C over the Clear Fork of the Trinity River, 0.2 meter north of the south end of the east masonry pier, 1 meter below the rail, and 3 meters from the center of the track. (Note 4.*)

S₁₀.—At *Weatherford, Parker County, Tex.*, on Parker County courthouse, 1.1 meters south of the northeast corner-stone, 1 meter from the ground. (Note 1.*) Probably destroyed in rebuilding the courthouse.

T₁₀.—At *Weatherford, Parker County, Tex.*, in the northwest corner of the Texas & Pacific Railway park, 11 meters from the center of the main line of the railway, and 16 meters east of the northeast corner of the railway depot. (Note 11.*)

U₁₀.—About 1.4 miles west of *Weatherford, Parker County, Tex.*, on the Texas & Pacific Railway bridge 279A over the Clear Fork of the Trinity River, on top of the north end of the east masonry pier, 0.85 meter from the center of the north girder, and 1 meter below the rail. (Note 4.*)

V₁₀.—About 3 miles west of *Weatherford, Parker County, Tex.*, at the crossing of the Texas & Pacific Railway and the Weatherford-Mineral Wells county road, on the west side of the road, and on the north line of the railway right of way. (Note 2.*)

W₁₀.—At *Lambert, Parker County, Tex.*, in the southwest corner of the section-house yard, on the Texas & Pacific Railway property, on the north side of the track, and east of the main road crossing of the railway. (Note 2.*)

X₁₀.—About 4 miles east of *Millsap, Parker County, Tex.*, on the Texas & Pacific Railway right of way, 12 meters north of the track, and 2 meters west of the west fence of the road that crosses the track at this point. (Note 2.*)

Y₁₀.—At *Millsap, Parker County, Tex.*, on the Texas & Pacific Railway right of way, south of the track, west of the main road that crosses the track west of the depot, and 1 meter from the railway fence. (Note 11.*)

Z₁₀.—About 2.5 miles west of *Millsap, Parker County, Tex.*, on the Texas & Pacific Railway bridge 294B over Rock Creek, on the west concrete abutment, 0.3 meter below the rail, and 1.5 meter north of the center of the track (Note 4.*)

A₁₁.—At *Bennetts, Parker County, Tex.*, 13 meters south of the Texas & Pacific Railway main-line track at the station. (Note 11.*)

B₁₁.—About 1.5 miles east of *Brazos, Palo Pinto County, Tex.*, on the Texas & Pacific Railway right of way, 1 meter north of the south fence and 1 meter west of the fence on the west side of the road that crosses the track at this point and 19 meters west of bridge 300A. (Note 2.*)

C₁₁.—About 0.7 mile east of *Brazos, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 301A, on the south end of the east abutment wall, 0.2 meter below the rail. (Note 4.*)

D₁₁.—At *Brazos, Palo Pinto County, Tex.*, in front of the depot, 1 meter south of the north fence, on the Texas & Pacific Railway right of way. (Note 2.*)

E₁₁.—About 3.0 miles east of *Santo, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 305B over Palo Pinto Creek, on the north end of the west abutment, 0.2 meter north of the northwest corner of the footplate of the truss. (Note 4.*)

F₁₁.—About 0.7 mile east of *Santo, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 308A over Sunday Creek, on top of the north end of the east abutment, 1.6 meters below the rail at the end of the truss. (Note 4.*)

G₁₁.—At *Santo, Palo Pinto County, Tex.*, on the north side of the main-line track, 90 meters west of the depot and 1 meter from the corner of the right-of-way fence. (Note 11.*)

H₁₁.—About 3.9 miles east of *Santo, Palo Pinto County, Tex.*, on the Texas & Pacific Railway right of way, 465 feet west of a siding and 1 meter south of the fence between the railway and the county road. (Note 2.*)

I₁₁.—At *Judd, Palo Pinto County, Tex.*, on the Texas & Pacific Railway right of way, 1 meter south of the fence between the right of way and the county road and about 15 meters east of the station. (Note 2.*)

J₁₁.—About 1.9 miles east of *Gordon, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 317E over Bartons Creek, on top of the coping stone on the south end of the west abutment, 4.3 meters from the center of the track and 0.8 meter below the rail. (Note 4.*)

K₁₁.—At *Gordon, Palo Pinto County, Tex.*, 38 meters east of the center of the depot, on the east line of Locust Street. (Note 11.*)

L₁₁.—About 1 mile east of *Mingus, Palo Pinto County, Tex.*, north of the main-line track of the Texas & Pacific Railway and 1 meter south of the right-of-way fence. (Note 11.*)

M₁₁.—At *Mingus, Palo Pinto County, Tex.*, on the east face of the concrete water table of the center pillar supporting the porch roof of the Texas & Pacific Railway depot and 3 feet from the ground. (Note 1.*)

N₁₁.—About 1.4 miles west of *Mingus, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 324A over the South Fork of Palo Pinto Creek, on the north end of the east abutment 3.5 meters from the center of the track and 1 meter below the rail. (Note 4.*)

O₁₁.—At *Strawn, Palo Pinto County, Tex.*, on the north side of the Texas & Pacific Railway track in line with the telegraph poles, 530 meters east of the depot and 1 meter east of the fence to the cattle guard. (Note 2.*)

P₁₁.—At *Strawn, Palo Pinto County, Tex.*, on the north side of the Texas & Pacific Railway track, 394 meters west of the depot, 7 meters west of a pile culvert and 1 meter from the right-of-way fence. (Note 11.*)

Q₁₁.—About 2.3 miles west of *Strawn, Palo Pinto County, Tex.*, on the northeast corner of the southeast concrete footing of the Texas & Pacific Railway water tank. (Note 16.*)

R₁₁.—About 4.1 miles west of *Strawn, Palo Pinto County, Tex.*, on the Texas & Pacific Railway bridge 331A on top of the east abutment in the center of the track and 1 meter below the rail. (Note 4.*)

S₁₁.—About 0.9 mile east of *Wiles, Stevens County, Tex.*, on the Texas & Pacific Railway bridge 333D, on top of the south end of the east abutment. (Note 4.*)

T₁₁.—At *Wiles, Stevens County, Tex.*, north of the track at the Texas & Pacific Railway station, on the railway right of way, 1 meter from the north fence. (Note 2.*)

U₁₁.—About 0.7 mile west of *Wiles, Stevens County, Tex.*, on the Texas & Pacific Railway bridge 335A over the North Fork of Palo Pinto Creek, on the north end of the west abutment, 0.1 meter from the west end of the abutment, 0.65 meter from the north side of the abutment, and 1.6 meters below the rail. (Note 4.*)

V₁₁.—About 2.0 miles east of *Tiffin, Eastland County, Tex.*, on the Texas & Pacific Railway bridge 337D over the canyon of the North Fork of Palo Pinto Creek, on top of the coping of the fourth stone pier from the west end, 0.20 meter from the south end, and 0.57 meter from the west side of the pier, 2.0 meters from the center of the track, and 2.1 meters below the rail. (Note 16.*)

W₁₁.—At *Tiffin, Eastland County, Tex.*, on the west side of the main line of the Texas & Pacific Railway, 2 meters east of the right-of-way fence. (Note 2.*)

X₁₁.—At *Ranger, Eastland County, Tex.*, 5.58 meters northeast of the Texas & Pacific Railway depot, on the west side of the main-line track, 2 meters from the right-of-way fence. (Note 11.*)

Y₁₁.—At *Ranger, Eastland County, Tex.*, on the Texas & Pacific Railway depot, about 3 meters north of the south-east corner of the building and 1.3 meters above the ground. (Note 1.*)

Z₁₁.—About 1.0 mile west of *Ranger, Eastland County, Tex.*, on the west side of the track, 15 meters from the center of the main line of the Texas & Pacific Railway and 2.0 meters from the county-road fence. (Note 2.*)

A₁₂.—About 4.2 miles west of *Ranger, Eastland County, Tex.*, 90 meters west of the Texas & Pacific Railway culvert 346A, 12 meters west of the center of the main track and on line with the right-of-way fence. (Note 2.*)

B₁₂.—At *Olden, Eastland County, Tex.*, on the Texas & Pacific Railway right of way, west of the road crossing at the west end of the switch on the north side of the main line, 6 meters from the center of the track and 3 meters west of the cattle guard. (Note 2.*)

C₁₂.—About 2.0 miles east of *Eastland, Eastland County, Tex.*, on the west side of a public highway, 7 meters south of the main line of the Texas & Pacific Railway and 1 meter east of the western cattle guard. (Note 2.*)

D₁₂.—At *Eastland, Eastland County, Tex.*, at the west end of the old depot in the city park north of the Texas & Pacific Railway, 33 meters from the main road at the east side of the park, 46 meters from the main line of the railway, and 1 meter from the south fence of the park. (Note 11.*)

E₁₂.—About 2.6 miles west of *Eastland, Eastland County, Tex.*, on the north side of the main-line track of the Texas & Pacific Railway, on the railway right of way, 16 meters east of bridge 354D, and 1 meter from the fence. (Note 2.*)

F₁₂.—At *Lem, Eastland County, Tex.*, 16 meters north of the main line of the Texas & Pacific Railway at the station. (Note 2.*)

G₁₂.—At *Cisco, Eastland County, Tex.*, on the masonry between the doors of the Cisco Banking Co.'s bank building, 20 inches above the sidewalk, and 12 inches south of the north door. (Note 4.*)

H₁₂.—At *Cisco, Eastland County, Tex.*, at the north end of the park east of the station, west of the Texas Central Railroad, and south of the Texas & Pacific Railway. (Note 11.*)

I₁₂.—About 4.4 miles west of *Cisco, Eastland County, Tex.*, on the south side of the track, 10 meters west of bridge 366A over a byroad, 14 meters from the center of the track and in line with the right-of-way fence. (Note 2.*)

Lamb Δ .—About 2 miles east of *Dothan, Eastland County, Tex.*, 2 miles south and 5 miles west of Cisco, 1 mile south of the old Base Line public road, on one of the highest points of an extensive plateau. It is on the property of J. J. Livingston in a grove of low oak trees just to the east of a north-and-south road. The south gable of J. F. Lamb's house is distant about 120 meters in azimuth $158^{\circ} 12'$, and the east chimney of Livingston's house 78 meters in azimuth $356^{\circ} 28'$. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station and is marked by the point of a 40-penny nail projecting $\frac{1}{4}$ inch above the concrete that fills an iron pipe $1\frac{1}{2}$ inches in diameter, which in turn is embedded in a cylinder of concrete 20 inches in diameter.

Lamb Ref. Mark.—About 2 miles east of *Dothan, Eastland County, Tex.*, 21.1 meters in azimuth $105^{\circ} 24'$ from Lamb Δ described above, and 0.40 meter east of the fence line on the east side of the road. The mark is the point of a 40-penny nail projecting $\frac{1}{4}$ inch above the concrete that fills an iron pipe $1\frac{1}{2}$ inches in diameter, which in turn is embedded in a cylinder of concrete 12 inches in diameter.

J₁₂.—At *Dothan, Eastland County, Tex.*, 180 meters west of the depot on the north side of the Texas & Pacific Railway track, and 1 meter from the fence between the railroad right of way and the county road. (Note 11.*)

K₁₂.—About 3.3 miles east of *Putnam, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 15 meters north of the center of the track on the east side of the county road that crosses the track at this point. (Note 2.*)

L₁₂.—At *Putnam, Callahan County, Tex.*, 3 meters from the southwest corner of the square containing the mineral wells of the Putnam Mineral Water Co., 46 meters from the main line of the Texas & Pacific Railway, and 26.95 meters from southeast corner of the Farmers' State Bank Building. (Note 11.*)

M₁₂.—At *Putnam, Callahan County, Tex.*, on the Farmers' State Bank, 1.70 meters west of the southeast corner, and 0.55 meter above the sidewalk. (Note 4.*)

N₁₂.—About 2.5 miles west of *Putnam, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 15 meters south from the center of the track, and west of the county road that crosses the track at this point. (Note 2.*)

O₁₂.—At *Chautauqua, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 19 meters south of the center of the main-line track at the station, and 1 meter from the fence. (Note 11.*)

P₁₂.—About 2.9 miles west of *Chautauqua, Callahan County, Tex.*, on the Texas & Pacific Railway bridge 384A, over Mexia Creek, 0.25 meter from the north end and 0.20 meter from the east side of the east abutment. (Note 16.*)

Q₁₂.—About 1.8 miles east of *Baird, Callahan County, Tex.*, on the Texas & Pacific Railway bridge 385A, over Mexia Creek, on top of the north end of the east abutment. (Note 4.*)

R₁₂.—At *Baird, Callahan County, Tex.*, near the southwest corner of the station park east of the depot. (Note 11.*)

S₁₂.—At *Baird, Callahan County, Tex.*, on the south face of the southeast corner stone of the Callahan County courthouse, 3 feet from the ground. (Note 1.*)

T₁₂.—About 3 miles west of *Baird, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 9 meters north of the track, 2 meters east of the line fence running north, and 18 meters from a double oak tree in the county road. (Note 2.*)

U₁₂.—At *Clyde, Callahan County, Tex.*, on the Texas & Pacific Railway right of way, 15 meters north of the center of the track and 97 meters east of the depot. (Note 11.*)

V₁₂.—About 3 miles west of *Clyde, Callahan County, Tex.*, 11 meters south of the center of the Texas & Pacific Railway track, and just west of the county road that crosses the track at this point. (Note 2.*)

W₁₂.—At *Elmdale, Taylor County, Tex.*, 15 meters north of the center of the Texas & Pacific Railway track, on the west line of the county road running north, and 1 meter from the right-of-way fence. (Note 11.*)

X₁₂.—At *Abilene, Taylor County, Tex.*, on the south end of the east abutment of the overhead crossing of the Texas & Pacific Railway over the Wichita Valley Railroad, 36 meters from the center of the track, and 1 meter below the rail. (Note 4.*)

Y₁₂.—At *Abilene, Taylor County, Tex.*, near the southwest corner of the south steps of the United States Weather Bureau Building. (Note 11.*)

Z₁₂.—At *Abilene, Taylor County, Tex.*, on the main building of Christian College, on the top course of stone of the masonry of the porch, east of the steps, and 0.87 meter above the ground. (Note 4.*)

A₁₃.—At *Abilene, Taylor County, Tex.*, 1.1 miles west of the Texas & Pacific Railway depot, 12 meters south of the track. (Note 2.*)

B₁₃.—About 5 miles west of *Abilene, Taylor County, Tex.*, on the north side of the Texas & Pacific Railway track and west of the county road that crosses the railroad at this point. (Note 2.*)

C₁₃.—At *Tye, Taylor County, Tex.*, in the northeast corner of the yard of the section foreman's house belonging to the Texas & Pacific Railway, 8 meters south of the center of the main-line track. (Note 11.*)

D₁₃.—At *Tye, Taylor County, Tex.*, 225 meters west of the Texas & Pacific Railway depot, 14 meters north of the track and just west of a road which crosses the track. (Note 2.*)

E₁₃.—About 4.2 miles east of *Merkel, Taylor County, Tex.*, in the county road, 2 meters from the railway right-of-way fence, on the north side of the Texas & Pacific Railway at milepost 419. (Note 2.*)

F₁₃.—At *Merkel, Taylor County, Tex.*, on top of the southwest side of the circular concrete foundation of the Texas & Pacific Railway water-filtering tower, and about 6 inches above the ground. (Note 4.*)

G₁₃.—At *Merkel, Taylor County, Tex.*, at the northeast corner of Front and Kent Streets, on the south face of the corner stone at the southwest corner of a stone building belonging to Dr. Adkissen, and 1.3 meters above the sidewalk. (Note 4.*)

H₁₃.—At *Merkel, Taylor County, Tex.*, in front of the section foreman's house, 10 meters north of the main line of the Texas & Pacific Railway and just west of a road that crosses the track. (Note 11.*)

I₁₃.—About 2.5 miles west of *Merkel, Taylor County, Tex.*, on the Texas & Pacific Railway right of way, 14 meters north of the center of the track, 85 meters east of milepost 426, just west of a byroad crossing, and 2 meters from the fence of a county road paralleling the railway. (Note 2.*)

J₁₃.—At *Trent, Taylor County, Tex.*, on the Texas & Pacific Railway right of way, 33 meters west of the center of the depot, 14 meters north of the main line of the railway, and on the west line of the main street of the town. (Note 11.*)

K₁₃.—At *Trent, Taylor County, Tex.*, 62.0 meters west of the Texas & Pacific Railway depot, beside the track of the county road, and 1 meter outside the railway right-of-way fence at milepost 430. (Note 2.*)

L₁₃.—About 4 miles east of *Eskota, Fisher County, Tex.*, on the Texas & Pacific Railway right of way, south of the track at milepost 434 and 1 meter from the county-road fence. (Note 2.*)

M₁₃.—At *Eskota, Fisher County, Tex.*, on the Texas & Pacific Railway right of way, 349 meters west of the depot, 12 meters north of the track, and just inside the county-road fence. (Note 11.*)

N₁₃.—About 4.9 miles east of *Sweetwater, Nolan County, Tex.*, on the Texas & Pacific Railway bridge 443-C over Sweetwater Creek, on the south end of the east abutment at the level of the bridge seat, 1.45 meters below the rail, and 3.3 meters from the center of the track. (Note 4.*)

O₁₃.—About 4 miles east of *Sweetwater, Nolan County, Tex.*, on the east face of the west abutment of the Santa Fe Railway bridge over Sweetwater Creek near the overhead crossing of the Texas & Pacific Railway, 1.3 meters above the ground and 0.5 meter from the south end of the abutment. (Note 1.*)

P₁₃.—At *Sweetwater, Nolan County, Tex.*, in the southwest corner of the yard of the Nolan County courthouse, 32.6 meters from the southwest corner of the courthouse, and 4 paces from each of two trees in the southwest corner of the yard. (Note 11.*)

Q₁₃.—At *Sweetwater, Nolan County, Tex.*, on the west abutment of the overhead crossing of the Texas & Pacific Railway over the Kansas City, Mexico & Orient Railway, 0.80 meter from the south end of the abutment, 3.4 meters from the center of the Texas & Pacific Railway track, and 1.04 meters below the rail. (Note 4.*)

R₁₃.—About 3.6 miles west of *Sweetwater, Nolan County, Tex.*, on the Texas & Pacific Railway right of way, at the top of the first long, steep grade west of Sweetwater, and 12 meters south of the center of the track. (Note 2.*)

S₁₃.—At *Roscoe, Nolan County, Tex.*, 125 meters northwest of the Texas & Pacific Railway depot, 1 block east of the Roscoe-Snyder road, 1 meter east of the east line of a street running north and south, and 0.4 meter from the north end of the street. (Note 11.*)

T₁₃.—At *Roscoe, Nolan County, Tex.*, at the northeast corner of First and Cypress Streets, 2 blocks west and 1 block south of the Texas & Pacific Railway depot, on the west side of Lipscomb & Davis's store, 1.78 meters from the southwest corner, and 0.40 meter above the sidewalk. (Note 4.*)

Patterson Δ .—About 4 miles north of *Roscoe, Nolan County, Tex.*, on the farm of A. A. Patterson, who lives $\frac{3}{4}$ mile north of the bench mark. It is 9.8 meters to the north edge of the main east-and-west road, 700 meters east of the southwest corner of Patterson's property and between two of his tenant houses. The station is the surface mark of a Coast and Geodetic Survey triangulation station and is marked by the point of a 40-penny nail projecting $\frac{1}{4}$ inch above the concrete that fills an iron pipe $1\frac{1}{2}$ inches in diameter, which in turn is embedded in a cylinder of concrete 20 inches in diameter.

U₁₃.—About 3 miles west of *Roscoe, Nolan County, Tex.*, on the Texas & Pacific Railway right of way, 12 meters south of the track at milepost 459, and 1 meter from the fence of the county road paralleling the railroad. (Note 2.*)

V₁₃.—1 mile east of *Loraine, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, 75 meters west of the first culvert out of Loraine, 13 meters north of the center of the track, and 1 meter from the fence. (Note 2.*)

W₁₃.—At *Loraine, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, 144 meters west of the depot, 14 meters north of the center of the track, and 2 meters from the corner of the fence for the cattle guard. (Note 11.*)

X₁₃.—At *Loraine, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, at the third telegraph pole west of milepost 467, 0.8 kilometer west of the depot, 10 meters south of the track and just west of a road crossing. (Note 2.*)

Y₁₃.—About 3.5 miles east of *Colorado, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, 11 meters east of the sixth telegraph pole west of milepost 472, just east of a road crossing, and 10 meters north of the center of the track. (Note 2.*)

Z₁₃.—At *Colorado, Mitchell County, Tex.*, 135 meters east of the dwelling house of the Texas & Pacific Railway section foreman, on top of the south retaining wall of a reinforced concrete culvert over a dry ravine, 1 meter from the west end of the wall, 6 meters from the center of the track, and 0.4 meter below the rail. (Note 13.*)

A₁₄.—At *Colorado, Mitchell County, Tex.*, in the northeast corner of the yard of the Mitchell County courthouse; 5.2 meters from the northeast corner of the courthouse, 1.26 meters west and 1.80 meters south of the inside of a cement walk, and 1.7 meters from a poplar tree in the yard. (Note 11.*)

B₁₄.—At *Colorado, Mitchell County, Tex.*, on the Texas & Pacific Railway bridge, 476-D over the Colorado River, on top of the concrete pier at the east end of the truss, 0.4 meter from the west end of the pier, in the center of the track, and 0.43 meter below the rail. (Note 13.*)

C₁₄.—About 4.5 miles east of *Westbrook, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, near the fifth telegraph pole east of milepost 481, 14 meters north of the center of the track and 1 meter from the fence. (Note 2.)*

D₁₄.—At *Westbrook, Mitchell County, Tex.*, at the center of the east end of the Texas & Pacific Railway depot, 0.75 meter from the building. (Note 11.)*

E₁₄.—About 4.6 miles west of *Westbrook, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way at milepost 490, 13 meters north of the center of the track and 1 meter from the fence between the right of way and the county road. (Note 2.)*

F₁₄.—At *Iatan, Mitchell County, Tex.*, 9 meters east of the depot, on the Texas & Pacific Railway right of way, 7 meters south of the center of the main-line track, and 4.3 meters N. 15° E. of a large cottonwood tree. (Note 11.)*

G₁₄.—About 4.4 kilometers west of *Iatan, Mitchell County, Tex.*, on the Texas & Pacific Railway right of way, and 7½ telegraph poles west of milepost 497, and 12 meters north of the center of the track. (Note 2.)*

H₁₄.—About 5.8 kilometers east of *Coahoma, Howard County, Tex.*, on the Texas & Pacific Railway right of way at milepost 500, 12 meters south of the center of the main-line track. (Note 2.)*

I₁₄.—At *Coahoma, Howard County, Tex.*, at the southeast corner of the section-house yard, 81 meters west of the Texas & Pacific Railway depot, and 31 meters south of the center of the main-line track. (Note 11.)*

J₁₄.—About 3.0 kilometers west of *Coahoma, Howard County, Tex.*, on the Texas & Pacific Railway right of way, 10 meters west of the fourteenth telegraph pole west of milepost 504, and 14 meters north of the center of the track. (Note 2.)*

K₁₄.—About 1.3 kilometers east of *Big Spring, Howard County, Tex.*, on the Texas & Pacific Railway right of way, at the tenth telegraph pole east of milepost 512, just east of a road crossing which is at the west end of a short cut, and 10 meters north of the center of the track. (Note 11.)*

L₁₄.—At *Big Spring, Howard County, Tex.*, at grade line on the north face of the new brick depot of the Texas & Pacific Railway, 16.35 meters from the northeast corner of the building, 4.15 meters west of the center of the main entrance and 13.35 meters from the center of the main-line track. (Note 1.)*

M₁₄.—At *Big Spring, Howard County, Tex.*, 22 meters from the center of the main-line track of the Texas & Pacific Railway, on the west sidewalk in the front yard of the railway Y. M. C. A. building, 10.95 meters from the northwest corner of the building, 8.15 meters north of the west column of the porch, and 13.90 meters from the northeast corner of the porch. (Note 11.)*

South End Meridian Line.—At *Big Spring, Howard County, Tex.*, in the southwest corner of the courthouse yard. The bench mark is the center of the "G" of the inscription "U. S. C. & G. S.", on top of the hard limestone monument 7 inches square, projecting 6 inches above the surface, which marks the south end of the meridian line established in 1901. The north end of the meridian line is probably destroyed by recent improvements.

N₁₄.—About 6.2 kilometers west of *Big Spring, Howard County, Tex.*, on the Texas & Pacific Railway right of way, at milepost 524 (old numbering), about 160 meters west of the fill over the arm of Hughes Lake, and 12 meters north of the main-line track. (Note 2.)*

O₁₄.—About 10.3 kilometers west of *Big Spring, Howard County, Tex.*, on the Texas & Pacific Railway right of way, 11 meters south of the center of the track, 4 meters west of the fence at a road crossing, and 2 meters from the right-of-way fence. (Note 2.)*

P₁₄.—At *Morita, Howard County, Tex.*, on the Texas & Pacific Railway right of way, 73 meters west of the section house, 14 meters north of the center of the track in line with the right-of-way fence just west of a byroad crossing. (Note 11.)*

Q₁₄.—About 5.2 kilometers west of *Morita, Howard County, Tex.*, 9 meters north of the center of the Texas & Pacific Railway track, 2.5 meters from the right-of-way fence, on the east side of a byroad or trail that crosses the track to a house on the south side of the railroad. (Note 2.)*

R₁₄.—About 5.8 kilometers east of *Stanton, Martin County, Tex.*, on the Texas & Pacific Railway right of way, 25 meters north of the center of the track, and 2 meters from the fence of the county road paralleling the railroad. (Note 2.)*

Stanton Δ.—1 mile southeast of *Stanton, Martin County, Tex.*, on the highest point of a narrow ridge running north and south, about ½ mile south of the Texas & Pacific Railway, and S. 54° E. from the Stanton city water tower. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station, a standard cap triangulation station mark, screwed to the top of a 3-inch iron pipe which is embedded in concrete.

S₁₄.—At *Stanton, Martin County, Tex.*, in the northeast corner of the Martin County courthouse yard, 45.05 meters from the corner stone of the courthouse, 0.4 meter from the north fence of the yard and 1.5 meters from the east fence. (Note 11.)*

T₁₄.—At *Stanton, Martin County, Tex.*, on the south side of the circular concrete foundation of the Texas & Pacific Railway water-purifying tower, 0.28 meter from the steel wall, and 3.93 meters from the center of the track. (Note 4.)*

U₁₄.—About 4.5 kilometers west of *Stanton, Martin County, Tex.*, in the west side of a road crossing, 12 meters north of the center of the track, and 2 meters south of the line of the north right-of-way fence. (Note 2.)*

Stanton south base.—About 7½ miles west-southwest of *Stanton, Martin County, Tex.*, ⅓ of a mile north of the Texas & Pacific Railway, on clear level prairie land. The bench mark is the surface mark of a Coast and Geodetic

* See pp. 162-166.

Survey triangulation station, a standard cap station mark, screwed to the top of a 3-inch iron pipe which is embedded in concrete.

V₁₄.—At *Germania, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 44 meters west of the section foreman's house, 26.5 meters north of the center of the track, and 1 meter from the north right-of-way fence. (Note 11.*)

W₁₄.—About 1.3 kilometers west of *Germania, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 13 meters north of the center of the track, and 1.5 meters from the fence between the right of way and the county road that parallels the railway. (Note 2.*)

X₁₄.—About 7.8 kilometers east of *Midland, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 11 meters west of the tenth telegraph pole west of milepost 555, and 3 meters east of the fence of the road that crosses the track. (Note 2.*)

Y₁₄.—About 5.1 kilometers east of *Midland, Midland County, Tex.*, on the Texas & Pacific Railway right of way, about 60 meters from the rain gauge of the United States Weather Bureau, in range with the east side of a barn about 75 meters south of the track, 13 meters south of the center of the track and 1 meter from the fence between the right of way and the road paralleling it. (Note 2.*)

Z₁₄.—At *Midland, Midland County, Tex.*, 0.79 meter east of the southwest corner of the Texas & Pacific Railway depot, in the water table, 1.20 meters above the ground. (Note 4.*)

A₁₅.—At *Midland, Midland County, Tex.*, in the southeast corner of the Midland County courthouse yard, 47.5 meters from the southeast steps of the courthouse, 5.59 meters from a water plug in the street, and 4.87 meters west and 1.02 meters north of the inside of the walk. (Note 11.*)

B₁₅.—About 7.6 kilometers west of *Midland, Midland County, Tex.*, on the Texas & Pacific Railway right of way, at the west end of a spur track, 18 meters east of a by-road crossing, 13 meters south of the center of the main-line track and 0.5 meter from the fence between the right of way and the road paralleling the railroad. (Note 2.*)

Scar Δ .—7 miles west of *Midland, Midland County, Tex.*, and 3 miles east of Warfield, towns on the Texas & Pacific Railway, and $\frac{1}{2}$ mile south of the railroad, on a round knoll in a cultivated field, the property of the Scarborough Cattle Co. of Midland. The station is marked by a standard brass cap station mark screwed to the top of a 3-inch pipe.

C₁₅.—At *Warfield, Midland County, Tex.*, 20 meters east of the section-foreman's house, and 18 meters north of the center of the main track of the Texas & Pacific Railway. (Note 11.*)

D₁₅.—About 2.3 kilometers west of *Warfield, Midland County, Tex.*, on the Texas & Pacific Railway right of way, 13 meters south of the center of the track. (Note 2.*)

E₁₅.—About 8.5 kilometers east of *Odessa, Ector County, Tex.*, on the Texas & Pacific Railway right of way, near the third telegraph pole east of milepost 575, and 12 meters south of the center of the track. (Note 2.*)

Odessa Δ .—About 2 miles east of *Odessa, Ector County, Tex.*, and 1 mile north of the Texas & Pacific Railway, on the highest point of a low bare knoll in the pasture of C. P. Turner and $\frac{1}{2}$ mile north of his house. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station and is marked by a standard cap station mark screwed to the top of a 3-inch iron pipe which is embedded in concrete.

F₁₅.—At *Odessa, Ector County, Tex.*, on the southwest corner of the southwest stone footing of the Texas & Pacific Railway water tank. (Note 14.*)

G₁₅.—At *Odessa, Ector County, Tex.*, in the southwest corner of the Ector County courthouse yard, 42.1 meters from the southwest corner of the courthouse, and 0.72 meter from the concrete corner post of the yard. (Note 11.*)

H₁₅.—About 8.2 kilometers west of *Odessa, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 58 meters east of milepost 585 (old numbering), 13 meters south of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

I₁₅.—At *Douro, Ector County, Tex.*, on the range of the west side of the section-foreman's house, 21 meters south of the center of the main line of the Texas & Pacific Railway, and 28 meters S. 50° E. of a large cottonwood tree, north of the track. (Note 11.*)

J₁₅.—About 3.6 kilometers west of *Douro, Ector County, Tex.*, on the Texas & Pacific Railway right of way, at the highest point of the railway between Big Spring and Toyah, 180 meters east of the entrance to Dead Mans Cut, and 13 meters south of the center of the track at the point of curve of the first curve between Stanton and Metz. (Note 2.*)

K₁₅.—At *Metz, Ector County, Tex.*, in range with the west side of the section-foreman's house, 20 meters north of the center of the Texas & Pacific Railway track, and 1 meter from the right-of-way fence. The bench mark is the center of a 15-millimeter square cut in the top of a $5\frac{1}{2}$ -foot section of rail which is set to project about 1 foot above the ground.

L₁₅.—About 4.4 kilometers west of *Metz, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 1683 feet east of the summit of the highest hill between Metz and Monahans, 12 meters south of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

M₁₅.—About 8.8 kilometers west of *Metz, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 264 feet east of milepost 606, 125 feet west of a fence running north from the railway, 12.5 meters south of the center of the track, and 2 meters from the right-of-way fence. (Note 2.*)

N₁₅.—About 3.1 kilometers east of *Sand Hills, Winkler County, Tex.*, on the Texas & Pacific Railway right of way, 1.8 meters east of milepost 609, 13.0 meters south of the center of the track, and 2.0 meters from the south right-of-way fence. (Note 2.*)

O₁₅.—At *Sand Hills, Winkler County, Tex.*, on the Texas & Pacific Railway right of way, 28.95 meters northeast from the northeast corner of the section-foreman's house (main upright), 26.75 meters from the northwest corner of the tool house, 36.1 meters north of the center of the track, and 30 meters south of the right-of-way fence. (Note 11.)*

P₁₅.—About 3.4 kilometers west of *Sand Hills, Winkler County, Tex.*, 11.80 meters west of milepost 613 of the Texas & Pacific Railway, 13.5 meters south of the center of the track, and 1.85 meters north of the right-of-way fence. (Note 2.)*

Q₁₅.—At *Monahans, Ector County, Tex.*, 20 meters east of the depot at the southwest corner of the yard of the Texas & Pacific Railway agent's dwelling house, in line with two China trees in the yard, the nearest of which is 4 meters west. (Note 11.)*

R₁₅.—About 0.9 kilometers west of *Monahans, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 14 meters south of the center of the track at the whistling post. (Note 2.)*

S₁₅.—About 4.0 kilometers west of *Monahans, Ector County, Tex.*, on the Texas & Pacific Railway right of way, 14 meters north of the center of the track and 15 meters west of the section-line fence running north. (Note 2.)*

T₁₅.—At *Aroya, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 87 paces west of the section-foreman's dwelling house, 7.50 meters west of the southwest corner of the red sandstone quarters for the section hands, and in line with the south side or front of same, 20.95 meters north of the center of the main-line track, and 5.5 meters north of the line of the right-of-way fence. (Note 11.)*

U₁₅.—About 4 kilometers west of *Aroya, Ward County, Tex.*, on the Texas & Pacific Railway right of way, at east end of a mound of earth and rock used as a rail rest, 13.02 meters south of the center of the track, and 2.21 meters from the right-of-way fence. (Note 2.)*

V₁₅.—At *Pyote, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 53.0 meters west of the depot, 13.40 meters south of the center of the track, 1.95 meters north of the right-of-way fence, and 1.05 meters west of the cattle-guard fence. (Note 2.)*

W₁₅.—At *Pyote, Ward County, Tex.*, 11.21 meters west of the Texas & Pacific Railway depot, 18.4 meters west of the southwest corner of the stone house used as quarters for the section hands, and 17.7 meters north of the center of the main track. (Note 11.)*

X₁₅.—About 6.6 kilometers west of *Pyote, Ward County, Tex.*, on the Texas & Pacific Railway right of way, opposite a bungalow distant 175 meters to the south, 13.4 meters south of the center of the track, and 1.8 meters from the right-of-way fence. (Note 2.)*

Y₁₅.—A stone post at *Quito, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 13.5 meters south of the track, and 0.25 mile west of the section foreman's dwelling house. (Note 11.)*

Z₁₅.—About 1.7 miles west of *Quito, Ward County, Tex.*, on the Texas & Pacific Railway bridge 635A, on the main line 50 meters east of the quarry spur, on top of the south end of the coping stone of the east abutment, 0.15 meter from the west side of the stone and 0.55 meter from the south end, 2.20 meters from the center of the track, and 1.0 meter below the rail. (Note 15.)*

A₁₆.—About 2 miles west of *Quito, Ward County, Tex.*, on the Texas & Pacific Railway bridge 635D, on top of the north end of the coping stone of the west abutment, 0.66 meter from the east side and 0.80 meter from the north end of the stone, 0.90 meter below the rail, and 2.10 meters north of the center of the track. (Note 4.)*

B₁₆.—About 2.3 miles west of *Quito, Ward County, Tex.*, on the Texas & Pacific Railway bridge 636A, just west of a rock quarry, on top of the north end of the west abutment, 1.15 meters from the north end and 0.14 meter from east edge of the coping stone, 1.5 meters from the center of the track and 0.9 meter below the rail. (Note 16.)*

C₁₆.—About 5 kilometers east of *Barstow, Ward County, Tex.*, on the south end of the east abutment of a Texas & Pacific Railway culvert, 0.30 meter from the west side and 0.55 meter from the south end of the coping stone, 2.23 meters south of the center of the track, and 0.9 meter below the rail. (Note 5.)*

Hays Δ.—About 4½ miles northeasterly from *Barstow, Ward County, Tex.*, on the northwest corner and highest point of the first very prominent hill northeast of Barstow, 1¾ miles N. 28° W. from Rogers' rock quarry, and in the pasture of N. L. Hays, whose ranch house is 1 mile S. 55° E. from the station. The bench mark is the surface mark of a Coast and Geodetic Survey triangulation station, a standard cap station mark screwed to the top of a 3-inch iron pipe which is embedded in concrete.

D₁₆.—About 1.0 kilometer east of *Barstow, Ward County, Tex.*, 3.35 feet east of the house near the track on the north side, 12.6 meters north of the center of the track, 2.7 meters south of the north right-of-way fence, and 25.4 meters north of section post 176-177. (Note 2.)*

E₁₆.—At *Barstow, Ward County, Tex.*, in the Ward County courthouse yard, 31.2 meters south and 4.7 meters west of the center of the main entrance to the building, 4.7 meters west of the front gateway, and 2.3 meters north of the south yard fence. (Note 11.)*

F₁₆.—About 1.6 miles west of *Barstow, Ward County, Tex.*, on the Texas & Pacific Railway right of way, 43.3 meters west of bridge 641A, which is an inverted siphon for an irrigation ditch, 12.50 meters south of the center of the track, and 1.88 meters from the right-of-way fence. (Note 2.)*

G₁₆.—About 4.9 kilometers east of *Pecos, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 20.9 meters west of bridge 643A over an irrigation ditch, 13.5 meters south of the center of the track, and 1.75 meters from the fence. (Note 2.)*

* See pp. 162-166.

H₁₆.—About 2.1 miles east of *Pecos, Reeves County, Tex.*, on the Texas & Pacific Railway bridge 644B over the Pecos River, on top of the north end of the west abutment, 0.33 meter from the east side of the coping stone, 0.54 meter south of the center of the north truss, 1.75 meters from the north end of the abutment, 2 meters north of the center of the track, and 0.8 meter below the rail. (Note 4.)*

I₁₆.—At *Pecos, Reeves County, Tex.*, across the street from the Texas & Pacific Railway passenger station, on the north wall of the annex to the Orient Hotel, 0.8 meter from the northeast corner, 0.3 meter from the east side of a window, and 1.10 meters above the sidewalk. (Note 1.)*

J₁₆.—At *Pecos, Reeves County, Tex.*, in the northeast corner of the yard of the section foreman's dwelling house, 9 meters south of the center of the main line of the Texas & Pacific Railway. (Note 11.)*

K₁₆.—About 6.5 kilometers west of *Pecos, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 2.4 meters from the south fence, 13.1 meters south of the center of the track, and 10.4 meters south by west of section post 178-179. (Note 2.)*

L₁₆.—About 3.9 kilometers east of *Hermosa, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 2.3 meters from the south fence, and 13.3 meters south of the center of the track at the west end of a mound of earth used as a rail rest. (Note 2.)*

M₁₆.—At *Hermosa, Reeves County, Tex.*, in the line of the south side (front) of the section foreman's dwelling house, 3.19 meters from the southwest corner, and 13.4 meters north of the center of the track. (Note 11.)*

N₁₆.—About 5.9 kilometers west of *Hermosa, Reeves County, Tex.*, 5.5 meters southwest of milepost 666 of the Texas & Pacific Railway, 13.4 meters south of the center of the track, and 2.0 meters from the right-of-way fence. (Note 2.)*

O₁₆.—About 3.9 kilometers east of *Toyah, Reeves County, Tex.*, 14.7 meters north of the center of the Texas & Pacific Railway track, 1.5 meters from the north right-of-way fence, and 40 meters from point of curvature of the only curve between *Hermosa* and *Toyah*. (Note 2.)*

P₁₆.—At *Toyah, Reeves County, Tex.*, a stone post on the Texas & Pacific Railway right of way, 395 meters west of the depot, 7.10 meters east of the southeast corner of the section house in range with the front of the house, 2.05 meters east of a large cottonwood tree, and 10.3 meters north of the center of the main track. (Note 11.)*

Q₁₆.—At *Toyah, Reeves County, Tex.*, 559 meters west of the depot, on the southeast corner of the southeast stone footing of the more westerly one of two water tanks opposite the roundhouse of the Texas & Pacific Railway, and 3.0 meters from the center of the main track. (Note 16.)*

R₁₆.—At *Toyah, Reeves County, Tex.*, 759 meters west of the depot on the circular concrete foundation of the Texas & Pacific Railway water-softening tower, 0.48 meter east of the manhole near the bottom of the tank, and 7.6 meters south of the center of the main-line track. (Note 4.)*

S₁₆.—About 6.3 kilometers west of *Toyah, Reeves County, Tex.*, at the point of curve of the first curve of the Texas & Pacific Railway west of *Toyah*, 27.95 meters north of milepost 669, 14.4 meters north of the center of the track, and 1.0 meter from the north fence. (Note 2.)*

T₁₆.—About 11.2 kilometers west of *Toyah, Reeves County, Tex.*, on the Texas & Pacific Railway right of way, 3.8 meters southwest of milepost 672, 13.8 meters south of the center of the track, and 1.6 meters from the fence. (Note 2.)*

U₁₆.—At *Gomez, Reeves County, Tex.*, 1.95 meters west of the southwest corner of the section house, 13.55 meters north of the center of the track, and 26 meters north by west from milepost 676. (Note 11.)*

V₁₆.—About 4.1 kilometers west of *Gomez, Reeves County, Tex.*, 2.58 meters west of milepost 679, 12.90 meters south of the center of the track, and 2.5 meters from the fence. (Note 2.)*

W₁₆.—About 1.6 kilometers east of *San Martine, Reeves County, Tex.*, at the point of tangency of the first curve on the Texas & Pacific Railway, east of *San Martine*, 1920 feet east of milepost 686, 13.2 meters south of the center of the track, and 2.3 meters from the fence. (Note 2.)*

X₁₆.—At *San Martine, Reeves County, Tex.*, 0.74 meter west of the southwest corner of the section house, and 9.3 meters north of the center of the Texas & Pacific Railway track. (Note 11.)*

Y₁₆.—At *San Martine, Reeves County, Tex.*, on the southeast corner of the southeast masonry footing of the Texas & Pacific Railway water tank, 49 meters north of the center of the main track. (Note 16.)*

Z₁₆.—About 4.1 kilometers west of *San Martine, Reeves County, Tex.*, on the Texas & Pacific Railway bridge 688B, on top of the north wing wall of the west abutment, 3.6 meters from the west end of a bridge girder, and 2.4 meters north of the center of the track. (Note 4.)*

A₁₇.—About 9.0 kilometers east of *Kent, El Paso County, Tex.*, at the foot of the south point of the hill forming the west side wall of *Levinson* pond, at the thirteenth telegraph pole west of milepost 691, 14.2 meters north of the center of the track, 1.05 meters from the right-of-way fence, and 14 meters northeast of the small water tank alongside the track. (Note 2.)*

B₁₇.—About 5.5 kilometers east of *Kent, El Paso County, Tex.*, 84.0 meters west of milepost 694 of the Texas & Pacific Railway, at the east end of a cut, 1.93 meters north of the gauge of the north rail, 0.2 meter from the south edge of a flat stone in the cut, and 0.3 meter below the rail. (Note 4.)*

C₁₇.—At *Kent, El Paso County, Tex.*, 9.7 meters south of the main line of the Texas & Pacific Railway, in the northeast corner of the section-house yard, 6.6 meters from the northeast corner of the section house, and in range with two china trees, 3.80 meters east of the east tree. (Note 11.)*

D₁₇.—About 3.9 kilometers west of *Kent, El Paso County, Tex.*, 1.65 meters west of milepost 700 of the Texas & Pacific Railway, 12.80 meters south of the track, and 2.6 meters from the right-of-way fence. (Note 11.)*

E₁₇.—About 4.6 kilometers west of *Kent, El Paso County, Tex.*, 700 meters west of milepost 700 of the Texas & Pacific Railway, 70 meters east of the section-line fence running north, on the highest round-topped smooth rock in a cut, 2.60 meters north of the north rail, and 0.75 meter above the rail. (Note 4.)*

F₁₇.—At *Boracho, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, in front of the section-foreman's house, 5.0 meters from section post 190, 14.5 meters south of the center of the track, and 0.7 meter from the fence. (Note 11.)*

G₁₇.—About 2.3 kilometers west of *Boracho, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, 125 feet east of bridge 356, 13.1 meters south of the center of the track, and 2.2 meters from the fence. (Note 2.)*

H₁₇.—About 5.6 kilometers east of *Plateau, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, opposite the center of a small artificial pond 75 meters to the north, 14.10 meters north of the center of the track, and 1.0 meter from the fence. (Note 11.)*

I₁₇.—About 3.0 kilometers east of *Plateau, El Paso County, Tex.*, on top of a rock in the first cut of the Texas & Pacific Railway east of Plateau, about 1 meter north of the north rail and on a level with the top of the rail. (Note 4.)*

U. S. G. S. 3889 Vn Hn.—About 2.4 kilometers west of *Plateau, El Paso County, Tex.*, 100 feet south of the track of the Texas & Pacific Railway, and 10 feet north of a wagon road. (Note 18.)*

J₁₇.—At *Plateau, El Paso County, Tex.*, in front of and across the track from the section-foreman's house, 2 meters from the south right-of-way fence of the Texas & Pacific Railway. (Note 11.)*

K₁₇.—About 4.5 kilometers west of *Plateau, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, 6.05 meters west of milepost 721, 13.70 meters south of the center of the track, and 1.45 meters from the fence. (Note 2.)*

U. S. G. S. 3840 Vn Hn.—About 6.4 kilometers east of *Wild Horse, El Paso County, Tex.*, 15 feet southeast of the thirteenth telegraph pole east of milepost 723 of the Texas & Pacific Railway, 16.45 meters south of the center of the track, 1.6 meters south of the right-of-way fence, and on the north side of a wagon road. (Note 18.)*

U. S. G. S. 3826 Vn Hn.—About 1.5 kilometers east of *Wild Horse, El Paso County, Tex.*, 1900 feet east of milepost 726 of the Texas & Pacific Railway, 23.6 meters south of the track, 8.6 meters south of the right-of-way fence, and on the north side of a wagon road. (Note 18.)*

L₁₇.—At *Wild Horse, El Paso County, Tex.*, in front of and across the track from the section-foreman's house, 21.8 meters south of the main line of the Texas & Pacific Railway, and 1.8 meters from the right-of-way fence. (Note 11.)*

U. S. G. S. 3867 Vn Hn.—About 3.5 kilometers west of *Wild Horse, El Paso County, Tex.*, 1000 feet east of the Texas & Pacific Railway bridge 329, 50 feet south of the railroad track, and 10 feet south of a wagon road. (Note 18.)*

M₁₇.—About 5.3 kilometers west of *Wild Horse, El Paso County, Tex.*, 13.1 meters south of the center of the Texas & Pacific Railway track, 7.3 meters from the right-of-way fence, and 38 meters east of milepost 730. (Note 2.)*

N₁₇.—About 4.4 kilometers east of *Van Horn, El Paso County, Tex.*, 12.85 meters south of the center of the Texas & Pacific Railway track, 2.0 meters from the fence, and 3.70 meters west of milepost 732. (Note 2.)*

O₁₇.—At *Van Horn, El Paso County, Tex.*, 60 meters west of the Texas & Pacific Railway depot, 10.8 meters south of the center of the track, and 0.47 meters east of the fence of the section-foreman's yard. (Note 11.)*

U. S. G. S. 4039 Vn Hn.—At *Van Horn, El Paso County, Tex.*, 240 feet west of the station of the Texas & Pacific Railway, 100 feet south of the main track, and 4 feet south of a telegraph pole. (Note 18.)*

U. S. G. S. 4239 Vn Hn.—About 5.1 kilometers west of *Van Horn, El Paso County, Tex.*, 378 meters west of milepost 737 of the Texas & Pacific Railway, and 25 meters north of the center of the track. (Note 18.)*

U. S. G. S. 4395 Vn Hn.—About 9.1 kilometers west of *Van Horn, El Paso County, Tex.*, 1200 feet northwest of trestle 375 of the Texas & Pacific Railway, and 10 feet south of a wagon road. (Note 18.)*

U. S. G. S. 4603 Vn Hn.—About 2 miles east of *Allamore, El Paso County, Tex.*, 7 meters east of the east row of Spanish dagger trees, and 8.55 meters north of the center of the track. The station and section house to which the earlier description referred have been moved 2 miles west. (Note 18.)*

P₁₇.—1 mile east of *Allamore, El Paso County, Tex.*, at milepost 744 of the Texas & Pacific Railway, 13.75 meters north of the center of the track, and 1.45 meters from the right-of-way fence. (Note 11.)*

Allamore Δ .—At *Allamore, El Paso County, Tex.*, about 9 meters N. 20° W. from the center of the water tank, 12.5 meters north of the north rail of the Texas & Pacific Railway, and 1.6 meters south of the railway fence line. The present water tank probably differs a foot or two in position from the one referred to above. The bench mark is the top of a cap of the usual type for marking a Coast and Geodetic Survey triangulation station, the cap being screwed to the top of a 3-inch iron pipe.

Q₁₇.—1 mile west of *Allamore, El Paso County, Tex.*, at milepost 746 of the Texas & Pacific Railway, 240 feet west of bridge 747-A, 14.2 meters north of the center of the track, 3.2 meters from the right-of-way fence. (Note 2.)*

R₁₇.—About 4.0 miles west of *Allamore, El Paso County, Tex.*, at milepost 749 of the Texas & Pacific Railway, 12.7 meters north of the center of the track, and 2 meters from the right-of-way fence. (Note 2.)*

S₁₇.—About 3.0 kilometers east of *Eagle Flat, El Paso County, Tex.*, 9.9 meters east of milepost 751 of the Texas & Pacific Railway, 11.60 meters south of the center of the track, and 3.4 meters from the right-of-way fence. (Note 2.)*

T₁₇.—At *Eagle Flat, El Paso County, Tex.*, in front of and across the tracks from the section-foreman's house, in the range of the west end of the house, 24.9 meters south of the main line of the Texas & Pacific Railway, and 1.65 meters from the right-of-way fence. (Note 11.)*

U₁₇.—About 3.6 kilometers west of *Eagle Flat, El Paso County, Tex.*, 1.60 meters east of milepost 755 of the Texas & Pacific Railway, 12.20 meters south of the center of the track, and 2.8 meters from the right-of-way fence. (Note 11.*)

V₁₇.—About 9.3 kilometers east of *Sierra Blanca, El Paso County, Tex.*, 4.1 meters west of milepost 759 of the Texas & Pacific Railway, 11.9 meters south of the center of the track, and 3.3 meters north of the fence between the right of way and wagon road. (Note 2.*)

W₁₇.—At *La Valley* 8.6 kilometers east of *Sierra Blanca, El Paso County, Tex.*, on the Texas & Pacific Railway right of way, 12.8 meters south of the center of the track, 3.7 meters from the fence, and in front of the west wing of the La Valley Hotel, about 40 meters distant. (Note 11.*)

X₁₇.—About 5.6 kilometers east of *Sierra Blanca, El Paso County, Tex.*, 11.5 meters south of the center of the Texas & Pacific Railway track, 3.9 meters from the right-of-way fence, and 2.0 meters west of milepost 764. (Note 2.*)

Y₁₇.—At *Sierra Blanca, El Paso County, Tex.*, in range with the north side of the Galveston, Harrisburg & San Antonio Railway and the Texas & Pacific Railway depot, 16.0 meters west of the northwest corner, 9.20 meters south of the center of the main line of the latter railway, and 15.55 meters north of the center of the main line of the former railway. (Note 11.*)

Z₁₇.—About 2.7 kilometers west of *Sierra Blanca, El Paso County, Tex.*, 28.9 meters north of the center of the Galveston, Harrisburg & San Antonio Railway track, 1.66 meters from the right-of-way fence, 1075 feet east of bridge 738-B, and 13½ telegraph poles east of milepost 739. (Note 11.*)

A₁₈.—At *Etholen, El Paso County, Tex.*, 13.20 meters north of the station sign, 13.0 meters west of the engine house (pump station), 24.5 meters north of the center of the track, and 5.8 meters from the right-of-way fence. (Note 11.*)

B₁₈.—About 2.8 kilometers west of *Etholen, El Paso County, Tex.*, 3.37 meters west of milepost 743 of the Galveston, Harrisburg & San Antonio Railway, on the right of way, 12.80 meters south of the center of the track, 2.4 meters from the fence and 35 meters west of bridge 742-B. (Note 2.*)

C₁₈.—At *Lasca, El Paso County, Tex.*, 7.6 meters north of the station sign, and 14.4 meters north of the center of the track, on the right of way, 0.9 meter from the fence. (Note 11.*)

D₁₈.—About 2.7 kilometers east of *Torcer, El Paso County, Tex.*, 13.15 meters south of the center of the track, on the right of way, 1.85 meters from the fence, and 1.64 meters north of milepost 748. (Note 2.*)

E₁₈.—At *Torcer, El Paso County, Tex.*, 15.9 meters south of the southeast corner of the Galveston, Harrisburg & San Antonio Railway depot, 29.0 meters south of the center of the track, and 1.5 meters from the right-of-way fence. (Note 11.*)

F₁₈.—About 0.9 kilometer west of *Torcer, El Paso County, Tex.*, just west of the Horseshoe Bend on the Galveston, Harrisburg & San Antonio Railway, at transit station 39679+39, 293 feet east of milepost 751, 12.0 meters west of the center of the track, and 2.2 meters from the fence. (Note 2.*)

G₁₈.—About 4.3 kilometers west of *Torcer, El Paso County, Tex.*, opposite transit station 39880+47.7, on the Galveston, Harrisburg & San Antonio Railway, at the sixth telegraph pole east of the point of the mountain, 13.5 meters east of the center of the track, and 1.8 meters from the fence. (Note 2.*)

H₁₈.—About 2.8 kilometers east of *Finlay, El Paso County, Tex.*, 4 meters east of the second telegraph pole east of milepost 757, 24 meters west of bridge 756-I, 13.8 meters south of the center of the track, and 1.8 meters from the fence. (Note 2.*)

I₁₈.—At *Finlay, El Paso County, Tex.*, 9.5 meters west of the center of the Galveston, Harrisburg & San Antonio Railway depot, and 8.4 meters north of the center of the track. (Note 11.*)

J₁₈.—At *Tinaja, El Paso County, Tex.*, at the east end of a passing track, 12.3 meters southeast of the center of the track, 2.1 meters from the fence, and 120 feet west of bridge 672C of the Galveston, Harrisburg & San Antonio Railway. (Note 11.*)

K₁₈.—At *Madden, El Paso County, Tex.*, 4.6 meters from the station sign, 14.8 meters south of the center of the Galveston, Harrisburg & San Antonio Railway track, and 15.8 meters from the fence. (Note 2.*)

L₁₈.—At *Nulo, El Paso County, Tex.*, 4.1 meters north of the station sign, 14.1 meters north of the center of the Galveston, Harrisburg & San Antonio Railway track, and 1.8 meters from the fence. (Note 2.*)

M₁₈.—At *Fort Hancock, El Paso County, Tex.*, 200 meters west of the depot, 27.4 meters north of bridge 776B of the Galveston, Harrisburg & San Antonio Railway, and 2.9 meters from the right-of-way fence. (Note 11.*)

N₁₈.—About 6.0 kilometers west of *Fort Hancock, El Paso County, Tex.*, 3.0 meters west of milepost 780 of the Galveston, Harrisburg & San Antonio Railway, 13.3 meters south of the center of the track, and 1.8 meters from the right-of-way fence. (Note 2.*)

O₁₈.—At *Iser, El Paso County, Tex.*, 400 feet west of the east end of a passing track of the Galveston, Harrisburg & San Antonio Railway, 1000 feet east of the station sign, 25 meters west of bridge 783A, 13.7 meters south of the center of the track, and 1.8 meters from the fence. (Note 11.*)

P₁₈.—About 4 miles east of *Polvo, El Paso County, Tex.*, 60 meters west of milepost 786 of the Galveston, Harrisburg & San Antonio Railway, 11.5 meters south of the center of the track, and 13.7 meters from the fence. (Note 2.*)

Q₁₈.—About 2 miles east of *Polvo, El Paso County, Tex.*, 3.1 meters west of milepost 788 of the Galveston, Harrisburg & San Antonio Railway, 11.8 meters south of the center of the track, and 3.9 meters from the fence. (Note 2.*)

R₁₈.—At *Polvo, El Paso County, Tex.*, in front of and across the track from the section house, 11 meters west of the west end of a passing track of the Galveston, Harrisburg & San Antonio Railway, 15.9 meters south of the center of the main track, and 1.4 meters from the fence. (Note 2.*)

S₁₈.—About 2 miles west of *Polvo*, *El Paso County, Tex.*, 0.9 meter northwest of milepost 792 of the Galveston, Harrisburg & San Antonio Railway, 14.3 meters south of the center of the track, and 1.2 meters from the fence. (Note 2.)*

U. S. G. S. 3560.—About 2.2 miles west of *Polvo*, *El Paso County, Tex.*, 8 poles west of milepost 792 of the Galveston, Harrisburg & San Antonio Railway, 13.9 meters south of the center of the track, and 1.3 meters from the fence. (Note 18.)*

T₁₈.—About 3 kilometers east of *Fabens*, *El Paso County, Tex.*, 2.2 meters east of milepost 798 of the Galveston, Harrisburg & San Antonio Railway, 14.3 meters south of the center of the track, and 0.4 meter from the fence. (Note 2.)*

U₁₈.—At *Fabens*, *El Paso County, Tex.*, 65 meters east of the Galveston, Harrisburg & San Antonio Railway depot, 20.6 meters north of the center of the track, and 1.8 meters northeast of the right-of-way post. (Note 11.)*

V₁₈.—At *Fabens*, *El Paso County, Tex.*, on the northwest corner of the northwest footing of the water tank of the Galveston, Harrisburg & San Antonio Railway, 9.5 meters south of the center of the track. (Note 4.)*

U. S. R. S. 3572.14.—About 3.0 kilometers west of *Fabens*, *El Paso County, Tex.*, 9 meters west of the Galveston, Harrisburg & San Antonio Railway bridge 801G, 14.05 meters south of the center of the track, and 2.0 meters from the fence. The bench mark is an iron pipe stamped "U. S. Reclamation Service."

U. S. R. S. (3616), later stamp 3586.94.—About 3.6 kilometers east of *Clint*, *El Paso County, Tex.*, at the tenth pole west of milepost 805 of the Galveston, Harrisburg & San Antonio Railway, 400 feet west of a road crossing, 12.9 meters south of the center of the track, and 2.0 meters from the fence. (Note 18.)*

U. S. R. S. 3592.95.—At *Clint*, *El Paso County, Tex.*, in the southwest corner of the section-house yard, 7.7 meters north of the center of the main-line track of the Galveston, Harrisburg & San Antonio Railway. The bench mark is an iron pipe stamped "U. S. Reclamation Service."

W₁₈.—At *Clint*, *El Paso County, Tex.*, 400 meters west of the Galveston, Harrisburg & San Antonio Railway depot, on the north side of a wagon road, 11.7 meters south of the main line of the railway, and 2.5 meters west of bridge 807B over an irrigation ditch. (Note 11.)*

X₁₈.—About 2.5 kilometers west of *Clint*, *El Paso County, Tex.*, 14.0 meters north of the center of the Galveston, Harrisburg & San Antonio Railway track at milepost 809, and 1.1 meter from the fence. (Note 2.)*

U. S. R. S. 3600.09.—About 4.1 kilometers west of *Clint*, *El Paso County, Tex.*, 2.8 meters west of milepost 800 of the Galveston, Harrisburg & San Antonio Railway, 14.4 meters south of the center of the track, and 0.6 meter from the fence. The bench mark is an iron pipe stamped "U. S. Reclamation Service."

Y₁₈.—At *Belen*, *El Paso County, Tex.*, 45 meters west of the Galveston, Harrisburg & San Antonio Railway depot at the east end of a passing track, 16.3 meters south of the center of the track, on the south concrete face of the siphon wall of an irrigation ditch under the tracks, 0.15 meter from the west edge, and 0.19 meter from the top of the concrete. (Note 1.)*

U. S. G. S. (3644), later stamp 3614.68.—At *Belen*, *El Paso County, Tex.*, 10 poles east of milepost 813 of the Galveston, Harrisburg & San Antonio Railway, 14.5 meters north of the center of the track, and 11.0 meters east of an adobe hut, in the line of the right-of-way fence and some cottonwood trees. (Note 18.)*

Z₁₈.—At *Belen*, *El Paso County, Tex.*, 130 meters west of the west end of a passing track of the Galveston, Harrisburg & San Antonio Railway at milepost 813, 14.1 meters south of the center of the track, and 0.8 meter from the fence. (Note 11.)*

A₁₉.—At *Ysleta*, *El Paso County, Tex.*, about 200 meters west of the Galveston, Harrisburg & San Antonio Railway depot, 1.85 meters from the southwest corner of the section-house yard, and 8.75 meters north of the center of the track. (Note 11.)*

B₁₉.—About 5.2 kilometers west of *Ysleta*, *El Paso County, Tex.*, 0.9 meter east of milepost 820 of the Galveston, Harrisburg & San Antonio Railway, 14.3 meters south of the center of the track, and 0.5 meter from the fence. (Note 2.)*

C₁₉.—At *Alfalfa*, *El Paso County, Tex.*, 8.0 meters south of the station sign, 13.9 meters south of the center of the Galveston, Harrisburg & San Antonio Railway track, and 1.2 meters from the fence. (Note 2.)*

D₁₉.—About 1.2 kilometers west of *Alfalfa*, *El Paso County, Tex.*, on the reinforced concrete highway bridge of the macadamized county road, on top of the north north wing wall, 32 meters from the center of the Galveston, Harrisburg & San Antonio Railway track. (Note 1.)*

E₁₉.—At *El Paso*, *El Paso County, Tex.*, on top of the masonry pier at the northwest corner of the El Paso brewery, 1.1 meters north of the corner of the main building, and 28 meters south of the center of the Galveston, Harrisburg & San Antonio Railway tracks. (Note 4.)*

F₁₉.—At *El Paso*, *El Paso County, Tex.*, at the crossing of the Galveston, Harrisburg & San Antonio Railway and the El Paso & Southwestern Railroad tracks, in the northeast corner of a grassy plot 5.6 meters south of the former railroad, 14.0 meters east of the latter railroad, and 5.7 meters east of tower No. 47. (Note 11.)*

G₁₉.—At *El Paso*, *El Paso County, Tex.*, on the west face of the south concrete pier of the viaduct over the Galveston, Harrisburg & San Antonio Railway and the El Paso & Southwestern Railroad tracks, on Austin Street, 8.5 meters south of the main line of the former railroad, and 1.4 meters above the ground. (Note 1.)*

H₁₉.—At *El Paso, El Paso County, Tex.*, at the corner of Texas and Ochoa Streets. The bench mark which is an El Paso city monument, is the cross on the top of a copper bolt which is stamped U.S.B.M. and which is set in a concrete post 10 inches below the level of the paving and covered by an iron plate set in the paving.

U. S. G. S., 3698.—At *El Paso, El Paso County, Tex.*, at the west end of the lower step of the north entrance to El Paso City Hall. The bench mark disk is broken and half gone but the part remaining contains the bench mark and appears stable. (Note 17.*)

U. S. G. S., 365.—At *El Paso, El Paso County, Tex.*, at the east end of the lower step of the south entrance to the El Paso City Hall, on the sidewalk between the curb and the cement steps. The bench-mark tablet is stamped 365-B-1905. (Note 17.*)

U. S. G. S., 366.—At *El Paso, El Paso County, Tex.*, on top of the west end of the lower stone step of the south entrance to the El Paso County courthouse. The bench-mark tablet is stamped 366-B-1905. (Note 17.*)

City Bench Mark.—At *El Paso, El Paso County, Tex.*, a cross on the top of the pyramid stone at the west side of the north entrance to the El Paso County courthouse.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN JERICHO, TEX., AND ISLETA, N. MEX., 1911.

B₁₀.—At *Jericho, Donley County, Tex.* (See p. 245.)

I₁₉.—About 3.0 miles west of *Jericho, Donley County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 2 meters from the north fence, in line with the telegraph poles, 14.0 meters north of the center of the track, and about midway between 2 concrete culverts just west of milepost 711. (Note 2.*)

J₁₉.—At *Boydston, Gray County, Tex.*, 7 meters northeast of a county-line post between Gray and Donley Counties, on the Chicago, Rock Island & Gulf Railway right of way, 15 meters north of the center of the track, and 10 meters east of the first pole east of the pole marked "713/30." (Note 2.*)

K₁₉.—At *Groom, Carson County, Tex.*, on the right of way, across the track from and in range with the east end of the Chicago, Rock Island & Gulf Railway depot, 1 meter from the fence, and 48 meters south of the center of the main-line track. (Note 11.*)

L₁₉.—About 1.9 miles west of *Groom, Carson County, Tex.*, on top of the south end wall of the ballasted concrete culvert of the Chicago, Rock Island & Gulf Railway, at a pole marked 721-05. (Note 4.*)

M₁₉.—About 4.1 miles west of *Groom, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, in line with the telegraph poles, 14 meters north of the center of the track, and just east of the second pole west of the pole marked "723." (Note 2.*)

N₁₉.—At *Lark, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 30 meters north of the center of the track at the station sign, and 0.2 mile east of the section house. (Note 11.*)

O₁₉.—About 4.3 miles east of *Conway, Carson County, Tex.*, at a pole marked "730-20," on the Chicago, Rock Island & Gulf Railway opposite the east whistling post for a road crossing, 12 meters north of the center of the track, and 4 meters from the fence between the railroad and the wagon road paralleling the right of way. (Note 2.*)

P₁₉.—At *Conway, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, at the southwest corner of the crossing of two roads, 48 meters north of the center of the track, and 48 meters north 30° east of the north-east concrete foundation of the depot. (Note 2.*)

Q₁₉.—About 4.0 miles west of *Conway, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 165 meters east of a point of curve, and 11 meters north of the center of the track at milepost 739. (Note 2.*)

R₁₉.—At *Yarnall, Carson County, Tex.*, across the track from the section house, near the corner of the fence, 50 meters south of the center of the track. (Note 11.*)

S₁₉.—About 4 miles west of *Yarnall, Carson County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, at the west end of a long fill and near the east end of a cut, just east of a wagon trail crossing, 29 meters north of the center of the track, and 1.5 meters from the fence. (Note 2.*)

T₁₉.—At *Royal, Potter County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 27 meters south of the center of the track, in front of and across the track from the section house and in range with the west end, and 5 meters from the fence on the bank of a ditch bordered with locust bushes. (Note 2.*)

U₁₉.—About 6.5 kilometers east of *Amarillo, Potter County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 28.7 meters north of the center of the track at the point of tangent of the first curve out of Amarillo. It is at the point where the Chicago, Rock Island & Gulf Railway, and the Atchison, Topeka & Santa Fe Railway tracks begin to diverge, 35.2 meters from the center of the latter track, on the curve 1½ poles east of pole 756/30, and 96 meters east of bridge 7569. (Note 2.*)

V₁₉.—About 2.0 kilometers east of the Atchison, Topeka & Santa Fe Railway depot, at *Amarillo, Potter County, Tex.*, on the Chicago, Rock Island & Gulf Railway right of way, 3 meters west of the center of the track on top of the concrete foundation of the east semaphore for crossing the tracks of the other railway. (Note 1.*)

W₁₉.—About 1.3 kilometers east of the Atchison, Topeka & Santa Fe Railway depot at *Amarillo, Potter County, Tex.*, directly south of the west end of the signal tower at the crossing of this railway, the Chicago, Rock Island & Gulf Railway, and the Fort Worth & Denver City Railway, 18 paces from the tracks of the first, 63 paces from the tracks of the second, and 18 paces from the tracks of the last-mentioned railway. (Note 2.*)

* See pp. 162-176.

X₁₉.—At *Amarillo, Potter County, Tex.*, on the front face of the north pillar supporting the center arch of the porch of the Atchison, Topeka & Santa Fe Railway depot, 20 meters west of the center of the main-line track, and 1.44 meters above the brick paving. (Note 1.*)

Y₁₉.—At *Amarillo, Potter County, Tex.*, on the south face of the foundation of Amarillo City Hall, near the southwest corner, at the elevation of the bottom of the corner stone, and 0.4 meter distant. (Note 1.*)

Z₁₉.—At *Zita, Potter County, Tex.*, just west of the south end of the Atchison, Topeka & Santa Fe Railway station, 29.8 meters west of the center of the main-line track, and near the right-of-way fence. (Note 2.*)

A₂₀.—South of *Zita, Potter County, Tex.*, opposite the iron rail marking mile 560, on the Atchison, Topeka & Santa Fe Railway in line with the telegraph poles, 15 meters south of pole 560, 21.8 meters west of the center of the track, and 9 meters from the fence. (Note 2.*)

B₂₀.—At *Haney, Potter County, Tex.*, on the right of way of the Atchison, Topeka & Santa Fe Railway, 34 meters west of the center of the main-line track at the station sign, 1.2 meters from the right-of-way fence. (Note 11.*)

C₂₀.—About 4.7 miles east of *Canyon, Randall County, Tex.*, at the east end of Haney Pit, on top of the west end of the south abutment of the Atchison, Topeka & Santa Fe Railway bridge 565A. (Note 1.*)

D₂₀.—At *Canyon, Randall County, Tex.*, in the northwest corner of Randall County courthouse yard, at the center of the arc of the curbstone. (Note 11.*)

E₂₀.—At *Canyon, Randall County, Tex.*, 91 meters west of the Atchison, Topeka & Santa Fe Railway depot, 18 meters north of the main-line track, on the south face of the reinforced concrete pump station, 0.65 meter from the east side, and 1.3 meters above the foundation. (Note 1.*)

F₂₀.—At *Canyon, Randall County, Tex.*, on the southeast corner of the southwest footing of the Canyon waterworks tank, $\frac{1}{4}$ mile west of the Atchison, Topeka & Santa Fe Railway depot, and 150 meters north of the main line track. (Note 4.*)

G₂₀.—About 1.8 miles west of *Canyon, Randall County, Tex.*, on the top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete-arch bridge 572A. (Note 4.*)

H₂₀.—At *Lester, Randall County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 25 meters north of the center of the track, at the station sign, 1.5 meters from the fence and 7 meters east of a road crossing. (Note 2.*)

I₂₀.—At *Umbarger, Randall County, Tex.*, on the right of way at the Atchison, Topeka & Santa Fe Railway station, 27 meters north of the center of the track, and 4 meters from the fence. (Note 2.*)

J₂₀.—About 1.7 miles west of *Umbarger, Randall County, Tex.*, on top of the west end of the north head wall of cast-iron culvert 582A of the Atchison, Topeka & Santa Fe Railway. (Note 1.*)

K₂₀.—At *Dawn, Deaf Smith County, Tex.*, 440 meters west of the Atchison, Topeka & Santa Fe Railway station, 33 meters north of the concrete foundation of the water crane, 31 meters north of the center of the track, and 1.2 meters from the right-of-way fence and wagon road. (Note 2.*)

L₂₀.—About 2.6 miles west of *Dawn, Deaf Smith County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, on the south side of a road crossing at the ninth pole west of milepost 589, in line with a fence running south, 33 meters south of the center of the track, and 1 meter from the right-of-way fence. (Note 2.*)

M₂₀.—At *Joel, Deaf Smith County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 30 meters north of the center of the track at the station sign and 1.5 meters from the fence. (Note 2.*)

N₂₀.—About 2.0 miles west of *Joel, Deaf Smith County, Tex.*, on the top of the west end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway double-arch bridge 595A, 12 inches from the north side and 18 inches from the west end of the wall, and 2.5 meters below the rail. (Note 4.*)

O₂₀.—At *Hereford, Deaf Smith County, Tex.*, on the top of the southeast corner of the southeast footing of the Hereford waterworks tank, $\frac{1}{8}$ mile east of the Atchison, Topeka & Santa Fe Railway depot, and 95 meters south of main-line track. (Note 4.*)

P₂₀.—At *Hereford, Deaf Smith County, Tex.*, on the south face of the concrete basement entrance to Deaf Smith County courthouse, 1.3 meters above sidewalk, and 0.3 meter from the east side of the door. (Note 1.*)

Q₂₀.—At *Hereford, Deaf Smith County, Tex.*, at the southwest corner of the Atchison, Topeka & Santa Fe Railway depot, in the south face of the limestone water table, in the brick corner pier, 1.3 meters above the brick flagging. (Note 4.*)

R₂₀.—About 3.8 miles west of *Hereford, Deaf Smith County, Tex.*, at the eighth pole west of milepost 603 of the Atchison, Topeka & Santa Fe Railway, 51 meters west of a road crossing, 1 meter from the fence between the right of way and a parallel road, and 32 meters from the center of the track. (Note 2.*)

S₂₀.—At *Summerfield, Castro County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 1 meter from the north right-of-way fence, at the station sign. (Note 2.*)

T₂₀.—About 1.9 miles west of *Summerfield, Castro County, Tex.*, on the top of the east end of the south head wall of the Atchison, Topeka & Santa Fe Railway cast-iron culvert 609A. (Note 1.*)

U₂₀.—About 2.3 miles west of *Summerfield, Castro County, Tex.*, 14 meters north of the center of the Atchison, Topeka & Santa Fe Railway track, at milepost 610. (Note 11.*)

V₂₀.—At *Black, Parmer County, Tex.*, just outside the Atchison, Topeka & Santa Fe Railway right of way, on the north side of a wagon road, 19 meters south of the track, at a semaphore 200 meters west of the station sign. (Note 11.*)

W₂₀.—About 3.8 miles east of *Friona, Parmer County, Tex.*, just outside the Atchison, Topeka & Santa Fe Railway right of way, at milepost 618, on the north side of a wagon road paralleling the railroad. (Note 2.*)

X₂₀.—At *Friona, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 50 meters north of the track at the station, 300 meters east of the east stone gatepost, and 0.4 meter from the fence. (Note 11.*)

Y₂₀.—About 2.9 miles west of *Friona, Parmer County, Tex.*, 9½ poles east of milepost 626 of the Atchison, Topeka & Santa Fe Railway, at the west end of a long fill, in the wagon road 25 meters south of the center of the track, and just west of the point where the right of way narrows. (Note 2.*)

Z₂₀.—At *Parmerton, Parmer County, Tex.*, at the station sign, at milepost 628, 18 meters south of the center of the Atchison, Topeka & Santa Fe Railway, on the north side of a wagon road just off the right of way. (Note 11.*)

A₂₁.—About 2.0 miles west of *Parmerton, Parmer County, Tex.*, 18 meters south of the center of the Atchison, Topeka & Santa Fe Railway at pole marked 630, just off the right of way on the north side of a wagon road. (Note 2.*)

B₂₁.—At *Bovina, Parmer County, Tex.*, in range with the east end of the Atchison, Topeka & Santa Fe Railway depot, just off the right of way, about 40 meters north of the main-line track, in the edge of a locust plantation belonging to XIT ranch. (Note 11.*)

C₂₁.—About 1.5 miles west of *Bovina, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway bridge 635B, which is a 48-inch cast-iron pipe culvert, on top of the north concrete head wall 10 inches from the west end. (Note 1.*)

D₂₁.—About 4.0 miles west of *Bovina, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 15 meters north of the center of the track, and 4 poles west of the pole marked 638. (Note 2.*)

E₂₁.—At *Wilsey, Parmer County, Tex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 14 meters south of the center of the main-line track, 20 meters east of the station sign, and 2 meters west of the pole marked 641. (Note 2.*)

F₂₁.—About 2.0 miles west of *Wilsey, Parmer County, Tex.*, 18 meters south of the center of the Atchison, Topeka & Santa Fe Railway track, at pole marked 743, 9 meters west of a rail marking the exact mile, 1 meter off the right of way, and 20 meters north of a wagon road. (Note 11.*)

Q₂.—At *Texico, Curry County, N. Mex.*, on the north face or front of the Atchison, Topeka & Santa Fe Railway reinforced-concrete pump station, 0.87 meter east of the northeast corner, 1.10 meters west of the west side of the door, and 1.15 meters above the ground. (Note 4.*)

R₂.—At *Texico, Curry County, N. Mex.*, on the reinforced-concrete pillar between the baggage room and the waiting room of the Atchison, Topeka & Santa Fe Railway station, 1.4 meters above the flagging. (Note 1.*)

S₂.—About 3.8 miles west of *Texico, Curry County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 33 meters south of the center of the track, and 16 meters southwest of the eighth pole west of milepost 651, on the west side of a road crossing, in the fence corner north of a lane paralleling the railroad on the south side. (Note 2.*)

T₂.—About 1.7 miles east of *Clovis, Curry County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 32 meters south of the center of the track, 19 meters west of milepost 655, and 7 meters west of the iron marking the exact mile, in the corner of the fence on the east side of a road crossing. (Note 2.*)

U₂.—At *Clovis, Curry County, N. Mex.*, on top of the southwest footing of Clovis city water tank, ¼ mile east of the Atchison, Topeka & Santa Fe Railway depot, 18 meters northeast of the northeast corner of the engine house. (Note 4.*)

V₂.—At *Clovis, Curry County, N. Mex.*, directly opposite and west of the west end of the Atchison, Topeka & Santa Fe Railway freight depot, in the lawn between the depot and the Gran Quivera Hotel, 2.7 meters west of the west side of the freight platform, at the elevation of the concrete curbing around the lawn, 0.75 meter west of the east curb, 17 meters north of the south curb, and 29 meters north of the center of the main-line track. (Note 11.*)

W₂.—At *Clovis, Curry County, N. Mex.*, on the south face of the central pillar of the porch on the east end of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 20 meters north of the center of the main-line track, and 1.4 meters above the brick flagging. (Note 1.*)

X₂.—About 2.0 miles west of *Clovis, Curry County, N. Mex.*, 38 meters north of the center of the Atchison, Topeka & Santa Fe Railway track, in the wagon road that crosses the track, in line with the right-of-way fence, and 1.5 meters from the west road fence. (Note 2.*)

Y₂.—About 0.7 kilometer east of *Blacktower, Curry County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 661A, in the center of the abutment 0.55 meter from the north end, and 0.15 meter south of an iron bolt (railway bench mark 4309.60) at approximately the same elevation. (Note 4.*)

Z₂.—At *Blacktower, Curry County, N. Mex.*, on the right of way at the Atchison, Topeka & Santa Fe Railway depot, 28 meters north of the center of the operator's window, and 22 meters north of the center of the main-line track. (Note 11.*)

A₃.—At *Blacktower, Curry County, N. Mex.*, on the north face just west of the entrance to the waiting room of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 0.3 meter west of the west side of the door, and 1.4 meters above the brick flagging. (Note 4.*)

B₃.—About 3.9 miles west of *Blacktower, Curry County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway, opposite the fifth telegraph pole west of milepost 666, in a wagon-road crossing, 33 meters south of the center of the track, in line with the right-of-way fence, and 2.0 meters east of the cattle-guard fence. (Note 2.*)

C₃.—About 5.9 miles west of *Blacktower, Curry County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 668A, in the center of the abutment, 0.3 meter from the north

end, and 0.1 meter north of the round head of an iron bolt (railway bench mark 4367.67) at approximately the same elevation. (Note 1.*)

D₃.—1 mile west of *St. Vrain, Curry County, N. Mex.*, opposite the first telegraph pole west of the pole marked 674 on the Atchison, Topeka & Santa Fe Railway, 30 meters west of the section of rail marking the exact mile 674, in the line of the right-of-way fence, 34 meters north of the center of the track, and 1 meter west of the cattle-guard fence. (Note 11.*)

E₃.—About 0.8 mile east of *Melrose, Curry County, N. Mex.*, opposite the fourth pole west of milepost 780 on the Atchison, Topeka & Santa Fe Railway in a wagon-road crossing, 22 meters north of the center of the track, and 1.5 meters west of the fence to the cattle guard. (Note 2.*)

F₃.—At *Melrose, Curry County, N. Mex.*, on the south face of the center pillar of the porch at the east end of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 1.3 meters above the brick flagging. (Note 1.*)

G₃.—About 1.4 miles west of *Melrose, Curry County, N. Mex.*, on top of the north end of the east concrete abutment of the Atchison, Topeka & Santa Fe Railway bridge 682A over Fiddlers Draw, 0.1 meter south of the railway bench mark 4370.40, and at approximately the same elevation. (Note 4.*)

H₃.—At *Cantara, Curry County, N. Mex.*, 390 meters west of the station sign of the Atchison, Topeka & Santa Fe Railway, 20 meters east of the east side of the section house, just off the right of way, 30 meters south of the center of the track, and 1 meter south of the fence. (Note 11.*)

I₃.—About 2.0 miles east of *Krider, Roosevelt County, N. Mex.*, on top of the north end of the west concrete abutment of the Atchison, Topeka & Santa Fe Railway bridge 690A over Nixons Draw, 3 meters north of the center of the track, opposite the railway bench mark 4336.62 which is on the east abutment. (Note 1.*)

J₃.—At *Krider, Roosevelt County, N. Mex.*, 30 meters south of the Atchison, Topeka & Santa Fe Railway track at the station, just outside the right-of-way fence, and 50 meters west of the gate. (Note 2.*)

K₃.—About 2.0 miles west of *Krider, Roosevelt County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 694A, 2.75 meters north of the center of the track, and 0.1 meter north of the railway bench mark 4283.85 (iron bolt) at approximately the same elevation. (Note 4.*)

L₃.—*Tolar, Roosevelt County, N. Mex.*, just outside the south right-of-way fence at the station. (Note 2.*)

M₃.—About 1.5 miles west of *Tolar, Roosevelt County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 694A, 0.2 meter south of the railway bench mark 4181.87 (iron bolt), and 2.8 meters from the center of the track. (Note 1.*)

N₃.—At *Taiban, Roosevelt County, N. Mex.*, $\frac{1}{4}$ mile west of the Atchison, Topeka & Santa Fe Railway depot, 10 meters south of the center of the main-line track, on the south face of the reinforced-concrete pump house, 0.7 meter from the northeast corner, 1.23 meters from the east side of the doorway, and 1 meter above the ground. (Note 4.*)

O₃.— $\frac{3}{8}$ mile west of *Taiban, Roosevelt County, N. Mex.*, 440 meters west of the Atchison, Topeka & Santa Fe Railway reinforced-concrete pump house, 30 meters south of the center of the track at the east whistling post for a road crossing, and just outside the right-of-way fence. (Note 11.*)

P₃.—About 2.4 miles east of *La Lande, Roosevelt County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 707B, 0.2 meter south of the railway bench mark 4168.56 (iron bolt), at approximately the same elevation, and 2.7 meters north of the center of the track. (Note 1.*)

Q₃.—At *La Lande, Roosevelt County, N. Mex.*, in range with the west end of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 50 meters south of the southwest corner, 47 meters from the center of the main-line track, and 3 meters south of a ditch. (Note 2.*)

R₃.—About 3.4 miles east of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 713B, 2.7 meters from the center of the track, and 0.1 meter south of the railroad bench mark 4118.00 (iron bolt). (Note 4.*)

S₃.—About 0.7 mile east of *Fort Sumner, Guadalupe County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 716A, at the elevation of the railroad bench mark 4055.05, and 2.7 meters from the center of the track. (Note 1.*)

T₃.—At *Fort Sumner, Guadalupe County, N. Mex.*, 600 meters east of the Atchison, Topeka & Santa Fe Railway depot, on the right of way, 25 meters east of the east end of a passing track, 36 meters east of point of tangency of curve 4280+10.2, and 33 meters north of the center of the track, 1 meter from the north fence, and 1 meter east of the fence to the cattle guard. (Note 11.*)

U₃.—At *Fort Sumner, Guadalupe County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, near the southeast corner, 0.9 meter east of the east side of the waiting-room door, and 1.35 meters above the brick flagging. (Note 1.*)

V₃.—About 0.6 mile west of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 717A. (Note 4.*)

U. S. G. S. B. M. Fort Sumner.—At *Fort Sumner, Guadalupe County, N. Mex.*, 1.5 miles west of the Atchison, Topeka & Santa Fe Railway depot, at the west side of "Old Town," on the north side of the road, 18 meters north of a line of telephone poles, and 50 meters west of an adobe house. The east end of the Pecos River bridge bears S. 70° W., a concrete arch bears N. 55° W., distant about 475 meters, and the west abutment of the railway bridge 717A bears N. 70° E. The bench mark is a U. S. G. S. iron pipe, the center of the cap battered down about 5 millimeters, but otherwise in good condition.

W₃.—About 1.8 miles west of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 718B, over the Pecos River, 2.65 meters north of the center of the track, 0.40 meter from the north end, and 0.91 meter from the west side of the abutment. (Note 1.*)

X₃.—About 2.2 miles west of *Fort Sumner, Guadalupe County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 718B, over the Pecos River, 3.5 meters north of the center of the track. (Note 4.*)

Y₃.—About 4.2 miles west of *Fort Sumner, Guadalupe County, N. Mex.*, on the top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 721A, 2.7 meters from the center of the track. (Note 4.*)

Z₃.—At *Aguda, Guadalupe County, N. Mex.*, at the east end of a short cut on the Atchison, Topeka & Santa Fe Railway right of way, 43 meters west of the west line of the concrete foundation of the section house, 9 meters west of a road crossing, 32 meters south of the track at the mail crane, and 1.2 meters from the south right-of-way fence. (Note 2.*)

A₄.—At *Ricardo, Guadalupe County, N. Mex.*, on the east face of the pillar in the center of the east end of the porch of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 1.3 meters above the ground. (Note 1.*)

B₄.—About 2.7 miles west of *Ricardo, Guadalupe County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way, at the telegraph pole marked "733," 18 meters east of the rail section marking the exact mile, and 35 meters south of the center of the track. (Note 11.*)

C₄.—At *Evanola (Gillespie), Guadalupe County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way, 36 meters south of the center of the track at the station sign, and 36 meters east of the rail section marking mile 737. (Note 2.*)

D₄.—About 2.9 miles east of *Yeso, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 741A, at the elevation of the railway bench mark 4696.07 (iron spike), and 2.85 meters from the center of the track. (Note 1.*)

E₄.—At *Yeso, Guadalupe County, N. Mex.*, 100 meters west of the Atchison, Topeka & Santa Fe Railway depot, on the right of way, just east of a road crossing, about 40 meters north of the center of the main-line track, and 0.8 meter from the fence. (Note 11.*)

F₄.—At *Yeso, Guadalupe County, N. Mex.*, $\frac{1}{4}$ mile west of the Atchison, Topeka & Santa Fe Railway depot, on top of the northeast corner of the southeast footing of the coal chute, 7.6 meters south of the center of the main-line track, and 2.4 meters south of the center of a passing track. (Note 16.*)

G₄.—At *Largo, Guadalupe County, N. Mex.*, on the right of way of the Atchison, Topeka & Santa Fe Railway, 31 meters south of the center of the track, in range with the west end of the section house, and 0.8 meter from the south fence. (Note 2.*)

H₄.—About 0.9 mile west of *Largo, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 751A, 0.15 meter north of the railway bench mark 4991.27 (iron bolt). (Note 1.*)

I₄.—At *Buchanan, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 285 meters east of the depot, 43 meters south of the center of the track in range with the west end of the section house, and 20 meters east of a gate in the south fence. (Note 11.*)

J₄.—About 0.7 mile west of *Buchanan, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 756A, over Gillespie Draw, 2.6 meters from the center of the track and 0.15 meter south of the railway bench mark 5142.88 (iron bolt). (Note 4.*)

K₄.—About 2.7 miles west of *Buchanan, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 758C, 2.55 meters from the center of the track and 0.25 meter south of the railway bench mark 5206.57 (iron bolt). (Note 16.*)

L₄.—At *Cardenas, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 240 meters east of the station sign, 78 meters east of the east side of the section house, 33 meters south of the center of the main-line track, and 6 meters west of a gate in the south fence. (Note 2.*)

M₄.—About 1.2 miles west of *Cardenas, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 762B, over Bonita Draw, 2.93 meters from the center of the track, and 0.13 meter north of the railway bench mark 5325.13 (iron bolt). (Note 4.*)

N₄.—At *Duoro, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 224 meters east of the depot, 46 meters north of the center of the main-line track, and 1 meter from the fence. (Note 11.*)

O₄.—About 1.7 miles west of *Duoro, Guadalupe County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 770B, 2.8 meters from the center of the track. (Note 1.*)

P₄.—About 4.6 miles west of *Duoro, Guadalupe County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 773A, 2.85 meters from the center of the track. (Note 16.*)

Q₄.—At *Casas, Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 473 meters east of the station sign, 30 meters south of the center of the track in range with the west side of the section house, and 52 meters southwest of bridge 775B. (Note 11.*)

R₄.—About 1.5 miles west of *Casas, Guadalupe County, N. Mex.*, on top of the east end of the south retaining wall of the double concrete arch 777A of the Atchison, Topeka & Santa Fe Railway, 2.9 meters south of the center of the track. (Note 1.*)

S₄.—At *Iden*, *Guadalupe County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, across the track from and in range with the west end of the section house, 31 meters south of the center of the main-line track, and 1 meter from the fence. (Note 2.*)

T₄.—About 2.7 miles east of *Vaughn*, *Guadalupe County, N. Mex.*, on top of the west end of the north retaining wall of the concrete arch 784B on the Atchison, Topeka & Santa Fe Railway, 3.75 meters north of the center of the track. (Note 4.*)

U₄.—At *Vaughn*, *Guadalupe County, N. Mex.*, on north face of the center pillar of the porch of the Atchison, Topeka & Santa Fe Railway depot, 1.4 meters above the flagging. (Note 1.*)

V₄.—At *Vaughn*, *Guadalupe County, N. Mex.*, on top of the west pillar of the main entrance to the Atchison, Topeka & Santa Fe Railway reading room. (Note 1.*)

W₄.—About 1.4 miles west of *Vaughn*, *Guadalupe County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way about 75 meters east of milepost 789, on the east slope of a knoll opposite a rock quarry, and 34 meters south of the center of the track. (Note 2.*)

X₄.—About 2.9 miles west of *Vaughn*, *Guadalupe County, N. Mex.*, on top of the east end of the south retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch, 789A, over the El Paso & Southwestern Railroad tracks, about 4.0 meters below the rail. (Note 1.*)

Y₄.—At *Tejon*, *Torrance County, N. Mex.*, 30 meters west of the west end of a passing track, on top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 792A. (Note 16.*)

Z₄.—About 2.2 miles east of *Carnero*, *Torrance County, N. Mex.*, on top of the south retaining wall of the double concrete arch, 795A, on the the Atchison, Topeka & Santa Fe Railway, 4.6 meters from the center of the track. (Note 1.*)

A₅.—At *Carnero*, *Torrance County, N. Mex.*, 247 meters west of the station sign, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 798A, 2.68 meters from the center of the track. (Note 1.*)

B₅.—About 3.4 miles east of *Encino*, *Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 800A, 2.62 meters from the center of the track. (Note 16.*)

C₅.—At *Encino*, *Torrance County, N. Mex.*, on the south face or front of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 0.7 meter west of the west side of the arch on the east end of the depot, 0.9 meter east of the east side of the door to the waiting room, and 1.3 meters above the flagging. (Note 1.*)

D₅.—About 2.2 miles west of *Encino*, *Torrance County, N. Mex.*, just off the Atchison, Topeka & Santa Fe Railway right of way, 33 meters south of the center of the track at milepost 806, and on the north side of a wagon road. (Note 2.*)

E₅.—About 1.8 miles east of *Negra*, *Torrance County, N. Mex.*, on top of the north end of east abutment of the Atchison, Topeka & Santa Fe Railway bridge 806A, 2.9 meters north of the center of the track. (Note 1.*)

F₅.—At *Negra*, *Torrance County, N. Mex.*, on top of the north head wall of the Atchison, Topeka & Santa Fe Railway cast-iron culvert 808B, 3.4 meters from the center of the track. (Note 1.*)

G₅.—About 2.9 miles east of *Pedral*, *Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 812A, 2.8 meters from the center of the track. (Note 1.*)

H₅.—At *Pedral*, *Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 32 meters south of the center of the track, in range with the east end of the depot. (Note 2.*)

I₅.—At *Dunmoor*, *Torrance County, N. Mex.*, at the east end of a passing track, 500 meters east of the station sign, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 818A, 2.8 meters from the center of the track. (Note 1.*)

J₅.—About 2.8 miles west of *Dunmoor*, *Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 30 meters south of the center of the track, at milepost 822, about 110 meters east of a point of curve. (Note 2.*)

K₅.—About 3.1 miles east of *Lucy*, *Torrance County, N. Mex.*, on top of the east end of the north retaining wall of the double concrete arch 825A on the Atchison, Topeka & Santa Fe Railway. (Note 16.*)

L₅.—About 0.9 mile east of *Lucy*, *Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 827A. (Note 16.*)

M₅.—At *Lucy*, *Torrance County, N. Mex.*, 33 meters south of the center of the track at the Atchison, Topeka & Santa Fe Railway depot. (Note 2.*)

N₅.—About 4.2 miles west of *Lucy*, *Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 32 meters south of the center of the track at milepost 833. (Note 2.*)

O₅.—At *Silio*, *Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, $\frac{1}{8}$ mile east of the station sign, and 28 meters south of the center of the track at milepost 836. (Note 2.*)

P₅.—At *Willard*, *Torrance County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway pump house, 0.20 meter from the southwest corner, and 1.50 meters above the ground. (Note 4.*)

Q₅.—At *Willard*, *Torrance County, N. Mex.*, about $\frac{1}{4}$ mile east of the Atchison, Topeka & Santa Fe Railway depot, on the right of way, 33 meters south of the center of the track, and 85 meters east of the crossing of the New Mexico Central Railroad tracks. (Note 2.*)

R₅.—At *Willard*, *Torrance County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reinforced-concrete depot, 0.60 meter east of the east side of the waiting-room door, 0.67 meter west of the west side of the porch arch, and 1.27 meters above the flagging. (Note 1.*)

S₅.—About 3.8 miles west of *Willard, Torrance County, N. Mex.*, on top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 845A. (Note 1.*)

T₅.—At *Broncho, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 31 meters south of the center of the track, in range with the west side of the section house, 0.8 meter from the south fence, and 5 meters east of the east end of a passing track. (Note 2.*)

U₅.—At *Broncho, Torrance County, N. Mex.*, about 70 meters west of the west end of a passing track, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 849C. (Note 4.*)

V₅.—About 3.3 miles east of *Mountainair, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 852A. (Note 1.*)

W₅.—At *Mountainair, Torrance County, N. Mex.*, 0.4 mile east of the Atchison, Topeka & Santa Fe Railway depot, on top of the south end of the east abutment of bridge 855A. (Note 4.*)

X₅.—At *Mountainair, Torrance County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reinforced concrete depot, 0.95 meter east of the east side of the waiting-room door, 0.70 meter west of the west side of the porch arch, and 1.34 meters above the flagging. (Note 1.*)

Y₅.—About 1.7 miles west of *Mountainair, Torrance County, N. Mex.*, on top of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 857A. (Note 4.*)

Z₅.—About 3.8 miles west of *Mountainair, Torrance County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 859A. (Note 4.*)

A₆.—At *Abo, Torrance County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 35 meters south of the center of the track, and 0.5 meter from the south fence, in range with the west side of section house, and 30 meters east of bridge 861D. (Note 2.*)

B₆.—About 0.6 mile west of *Abo, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 862A. (Note 1.*)

C₆.—About 2.8 miles west of *Abo, Torrance County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 865D. (Note 4.*)

D₆.—About 0.4 mile west of *Scholle, Valencia County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 869A. (Note 1.*)

E₆.—About 0.9 mile west of *Scholle, Valencia County, N. Mex.*, on top of the east end of the north retaining wall of the Atchison, Topeka & Santa Fe Railway concrete arch 869B. (Note 4.*)

F₆.—About 2.5 miles west of *Scholle, Valencia County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 871B, the first bridge over the Rio Abo going down the canyon. (Note 1.*)

G₆.—About 1.2 miles east of *Sais (siding), Valencia County, N. Mex.*, on top of the north end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 874A, the last bridge over the Rio Abo going down the canyon. (Note 4.*)

H₆.—At *Sais (siding), Valencia County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, 54 meters south of the center of the track, 0.8 meter from fence, and 17 meters east of the range of the east side of the section house. (Note 2.*)

I₆.—At *Becker, Valencia County, N. Mex.*, on the west face of the Atchison, Topeka & Santa Fe Railway reinforced concrete pump house, 0.27 meter from the northwest corner, 1.17 meters above the ground, 0.38 meter north of the north side of the window, and 0.18 meter below the window sill. (Note 4.*)

J₆.—At *Becker, Valencia County, N. Mex.*, on the south face of the Atchison, Topeka & Santa Fe Railway reinforced concrete depot, 0.80 meter east of the east side of the waiting-room door, and 1.3 meters above the flagging. (Note 1.*)

K₆.—1 mile west of *Bodega, Valencia County, N. Mex.*, 23 meters south of the Atchison, Topeka & Santa Fe Railway track at the rail section marking mile 887, and 3 meters east of the telegraph pole marked "887." (Note 2.*)

L₆.—About 2.1 miles east of *Madrone, Valencia County, N. Mex.*, 23 meters south of the center of the Atchison, Topeka & Santa Fe Railway track, 7 meters west of the telegraph pole marked 890, $\frac{1}{4}$ mile west of a long cut, on the west slope of a small sandy knoll. (Note 2.*)

M₆.—At *Madrone, Valencia County, N. Mex.*, on the Atchison, Topeka & Santa Fe Railway right of way, in front of and across the track from the section house, 23 meters east of the center of the track, 4 meters east of a ditch, and 1 meter above the grade of the railroad. (Note 2.*)

N₆.—About 2.8 miles east of *Belen, Valencia County, N. Mex.*, on top of the north end of the east abutment of the Atchison, Topeka & Santa Fe Railway bridge 893A over the Rio Grande. (Note 1.*)

O₆.—About 2.7 miles east of *Belen, Valencia County, N. Mex.*, on the south end of the west abutment of the Atchison, Topeka & Santa Fe Railway bridge 893A over the Rio Grande. (Note 4.*)

U. S. G. S. 4793.—About 1.7 miles south of *Belen, Valencia County, N. Mex.*, 50 feet west of the junction of the Atchison, Topeka & Santa Fe Railway main line with the Belen cut-off, 260 feet south of milepost 934. (Note 18.*) The top of the cap was found apparently battered down about 1.5 centimeters; the cross in the center was, however, taken as the bench mark.

P₆.—At *Belen, Valencia County, N. Mex.*, on the east face of the Atchison, Topeka & Santa Fe Railway pebble-dashed brick depot, 0.64 meters from the northeast corner, 1.3 meters above the flagging. (Note 1.*)

Q₆.—At *Belen, Valencia County, N. Mex.*, in the sidewalk in the center of the north arch on the east side of the porch of the Atchison, Topeka & Santa Fe Railway eating house, a pebble-dashed brick structure, 100 meters east of the depot. (Note 4.*)

U. S. G. S. 4808.—About 1.2 miles north of *Belen, Valencia County, N. Mex.*, 50 feet east of the Atchison, Topeka & Santa Fe Railway tracks at a road crossing. (Note 18.*)

U. S. G. S. 4821.—About 5.7 miles south of *Los Lunas, Valencia County, N. Mex.*, at the south end of the Mexican town of Los Chaves, 12 meters west of the Atchison, Topeka & Santa Fe Railway track, opposite the first pole south of milepost 928, on the west side of a wagon road paralleling the railroad, and 3 meters north of a large cottonwood tree. (Note 18.*)

U. S. G. S. 4833.—About 3.0 miles south of *Los Lunas, Valencia County, N. Mex.*, 50 feet east of the Atchison, Topeka & Santa Fe Railway track, 10 feet north of a gate. (Note 18.*)

R₆.—About 1.7 miles south of *Los Lunas, Valencia County, N. Mex.*, 17 meters west of the Atchison, Topeka & Santa Fe Railway tracks, 160 meters south of milepost 924, 0.5 meter south of the right-of-way fence, 7 meters east of a cottonwood tree on the bank of an irrigation ditch, and 1.5 meters north of a gate and of a road crossing. (Note 2.*)

S₆.—At *Los Lunas, Valencia County, N. Mex.*, 200 meters south of the Atchison, Topeka & Santa Fe Railway station, on the east face of the stone pump house, 0.34 meter north of the southeast corner, 0.34 meter south of the window at the level of the sill, and 1.34 meters above the ground. (Note 4.*)

U. S. G. S. 4851.—At *Los Lunas, Valencia County, N. Mex.*, 700 feet north of the Atchison, Topeka & Santa Fe Railway station, 60 feet west of the track at a road crossing, at the northeast corner of Solomon Lunas's yard fence. (Note 18.*)

T₆.—About 2.7 miles north of *Los Lunas, Valencia County, N. Mex.*, 15 meters east of the Atchison, Topeka & Santa Fe Railway tracks, 15 meters south of a gate, and 23 meters south of an old irrigation ditch. (Note 2.*)

U. S. G. S. 4891.—At *Isleta, Bernalillo County, N. Mex.* (See p. 241.)

N₂.—At *Isleta, Bernalillo County, N. Mex.* (See p. 241.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN LOUISVILLE, KY., AND CAIRO, ILL., ESTABLISHED BY THE CORPS OF ENGINEERS, UNITED STATES ARMY, IN 1903, 1905, AND 1906.

(These descriptions are from information furnished by the Chief of Engineers. Changes have been made chiefly for the purpose of condensing under general notes and indexing according to locality.)

U. S. E. B. M. No. 10 (=602B).—At *Louisville, Jefferson County, Ky.*, the north quadrant of a cross in a circle on an old abutment on the south side of the Louisville & Portland Canal, near the west end of the gate recess near Tenth Street.

U. S. E. B. M. 603.—At *Louisville, Jefferson County, Ky.*, on the south side of the Louisville & Portland Canal, about a mile east of the locks at Twenty-seventh Street. The mark is the top of an iron post, 3 feet underground, 3.75 meters from the eastern one of two cross marks in the canal wall, and 3.35 meters from the western one.

U. S. E. B. M. 604M.—At *Louisville, Jefferson County, Ky.*, on the west side of the approach to the Twenty-seventh Street Bridge. The mark is the top of an iron bar 4.3 meters south of the engine house.

P. B. M. 604.—At *Louisville, Jefferson County, Ky.*, near the foot of the stone steps and revetment in the rear of the power house at the upper lock chamber of the Louisville & Portland Canal. (Note 61.*)

Guard Pier.—At *Louisville, Jefferson County, Ky.*, a cross cut on the north abutment of the guard gates of the 80-foot lock of the Portland & Louisville Canal, 3.14 meters north of the south face of the abutment and 17.77 meters east of a bridge.

P. B. M. 604A.—At *Louisville, Jefferson County, Ky.*, a square, lettered U. S. B. M., cut in the west face of the downstream side of the mouth of the Thirty-fourth Street sewer, 1.5 meters from the northwest corner, and 1.8 meters below the top of the sewer.

P. B. M. 605.—At *Louisville, Jefferson County, Ky.*, opposite the plant of the Barth Leather Co., at New Albany, Ind., about 250 meters upstream from an old brick residence on the Kentucky shore, and 380 meters below the North Thirty-fifth Street sewer. (Note 61.*)

P. B. M. 606.—At *Louisville, Jefferson County, Ky.*, opposite the lower old frame house between the pumping station and the sawmill at New Albany, Ind., and directly opposite the rock ledge above Falling Run. The mark is the center of a cast-iron cap under a box lid, 3 feet below the surface of the ground.

P. B. M. 607.—At *Louisville, Jefferson County, Ky.*, at the top of the bank in Fontaine Ferry Park, 110 meters above the steps to the bathing beach, 76 meters above the bath houses, and opposite a point midway between the brick house and the upstream end of a rock ledge. (Note 61.*)

P. B. M. 607A.—At *Louisville, Jefferson County, Ky.*, below Fontaine Ferry Park, at the mouth of the Broadway sewer. The mark is a cross cut on an anchor bolt, the seventh in the land-side row counting from the upstream end of the mouth of the sewer. The capstone of the sewer is marked with a cross lettered U. S. B. M.

P. B. M. 608.—At *Louisville, Jefferson County, Ky.*, about 40 meters below the steps at the entrance to Riverview Park, and 5 meters down from the dancing pavilion, at the top of a bank. (Note 61.*)

P. B. M. 609.—At *Louisville, Jefferson County, Ky.*, opposite a one-story yellow house under a large silver poplar tree on the Indiana shore, 5 meters back from the top of the first bank above the river. (Note 61.*)

P. B. M. 610.—6 miles below *Louisville, Jefferson County, Ky.*, at the top of the first bank above the river, and about 250 meters below a new frame house with a metal roof, on the Indiana shore. (Note 61.*)

P. B. M. 611.—7 miles below *Louisville, Jefferson County, Ky.*, 5 meters back from the top of the first bank above the river, about 300 meters above the white brick house at the head of Hughes Bar, and opposite a point midway between a whitewashed barn and frame house on the Indiana shore. (Note 61.*)

P. B. M. 612.—8 miles below *Louisville, Jefferson County, Ky.*, halfway between the top of the first bank and the foot of the second bank above the river, about 400 meters above the Government light at Hughes Bar, and opposite a barn about 250 meters back from the top of the bank on the Indiana shore. (Note 61.*)

P. B. M. 613.—9 miles below *Louisville, Jefferson County, Ky.*, midway between the top of the first bank and the foot of the second bank above the river, about 295 meters above a gully 45 meters wide, and about 400 meters below a one-and-one-half story frame house on the Indiana shore. (Note 61.*)

P. B. M. 614.—In *Jefferson County, Ky.*, near *Bridgeport (Locust Point post office, Ind.)*, at the top of the first bank above the river, and about 300 meters below a two-story frame house on the Indiana shore. (Note 61.*)

P. B. M. 614A.—In *Jefferson County, Ky.*, opposite *Bridgeport (Locust Point post office, Ind.)* on the second terrace above the river. The mark is a railroad spike in the root of a 38-inch maple tree, which has been blazed by fire on the side away from the river, and on which the high-water marks of 1883 and 1884 are cut.

P. B. M. 615.—Near *Greenwood Landing, Jefferson County, Ky.*, 8 meters back from the top of the first bank above the river, and about 200 meters above a whitewashed barn on the Indiana shore. (Note 61.*)

P. B. M. 616.—At *Greenwood Landing, Jefferson County, Ky.*, at the foot of the second bank above the river, and about 250 meters above the Government light at *Beelers Landing, Ind.* (Note 61.*)

P. B. M. 617.—In *Jefferson County, Ky.*, near *Stewarts Landing, Ind.*, at the foot of the second bank above the river, opposite a point about 200 meters above the upstream side of the second ravine below *Frank McHarry's tomb* on the Indiana shore, and 0.6 meter down hill from the line of two 3-inch elm stumps, 2.1 meters apart. (Note 61.*)

P. B. M. 618.—Near *Valley Station, Jefferson County, Ky.*, about 900 meters above the highway leading to the station, and opposite a point about 500 meters above the steps on the Indiana shore, leading to *Maple Grove*. (Note 61.*)

P. B. M. 619.—Near *Johnsontown, Jefferson County, Ky.*, at the foot of the second bank above the river, $\frac{1}{2}$ mile below *Johnsontown Road Landing*, $\frac{2}{3}$ mile above *Twelve-Mile Light*, and opposite a two-story frame dwelling, surrounded by 3 red outbuildings, on the Indiana shore. (Note 61.*)

P. B. M. 620.—Near *Bethany, Jefferson County, Ky.*, at the line of cultivation 560 meters below *Twelve-Mile Light*, and opposite a point about 550 meters below an old barn on the Indiana shore. (Note 61.*)

P. B. M. 621.—Near *Kosmosdale, Jefferson County, Ky.*, and nearly opposite *Rees Landing, Ind.*, under the top of the second bank above the river, opposite the point of a cliff, and about 300 meters below a dwelling house on the Indiana shore. (Note 61.*)

P. B. M. 622.—Near *Kosmosdale, Jefferson County, Ky.*, 6 meters from the top of the river bank, near the line of cultivation, and about 150 meters below the whitewashed barn at *Rees Landing* on the Indiana shore. (Note 61.*)

P. B. M. 623.—Near *Kosmosdale, Jefferson County, Ky.*, at the top of the river bank, 10 meters from the line of cultivation, and about 900 meters above the Government light at *Rosewood Landing, Ind.* (Note 61.*) It was searched for without success in 1910.

P. B. M. 623A.—At *Kosmosdale, Jefferson County, Ky.*, a cross cut on the anchor bolt, 0.78 meter north of the south end of the pedestal at the south foot of the stiff-leg derrick of the *Kosmos Cement Works*.

P. B. M. 624.—At *Kosmosdale, Jefferson County, Ky.*, near the top of the river bank, about 120 meters below the *Kosmos Cement Works*, and 5 meters above a large cottonwood tree with an electric light suspended from the side facing the river. (Note 61.*) It was searched for without success in 1910.

P. B. M. 625.—Near *Kosmosdale, Jefferson County, Ky.*, 9 meters back from the top of the first bank above the river, at the edge of a line of willows and opposite a two-story frame house on the Indiana shore. (Note 61.*)

P. B. M. 626.—In *Jefferson County, Ky.*, near *West Point, Hardin County, Ky.*, about 35 meters directly up the river bank from a large rock at the waters edge, about 7 by 5 by 3.5 feet. (Note 61.*)

U. S. G. S. 441.—At *West Point, Hardin County, Ky.*, at the southeast corner of *Highland and Carter Streets*, on the stone window sill of the *Kentucky and Indiana Bank Building*. (Note 17.*)

P. B. M. 627.—At *West Point, Hardin County, Ky.*, 9 meters back from the top of the river bank, 240 meters below the Government light, and 3.7 meters from a fence line. (Note 61.*)

P. B. M. 628.—Near *West Point, Hardin County, Ky.*, at the edge of the willow line near the foot of the second bank above the river, and opposite a point about 240 meters above a white frame house under a cliff on the Indiana shore. (Note 61.*)

P. B. M. 629.—In *Hardin County, Ky.*, opposite *Evans Landing, Ind.*, 9 meters back from the top of the first bank above the river, and opposite the Government light on the Indiana shore. (Note 61.*)

P. B. M. 630.—In *Meade County, Ky.*, near *Browns Landing, Ind.*, at the top of the first bank above the river, at the edge of cultivation, and opposite a point about 240 meters below the white frame house at *Browns Landing*. (Note 61.*)

P. B. M. 631.—In *Meade County, Ky.*, near *Browns Landing, Ind.*, at the top of the first bank above the river, and opposite a point midway between the Government light on the Indiana shore and the mouth of *Mosquito Creek*. (Note 61.*)

P. B. M. 632.—Near *Rock Haven, Meade County, Ky.*, at the foot of the second bank above the river, 15 meters below a one-story frame house on the Kentucky shore, and opposite a point about 120 meters below the mouth of *Mosquito Creek* on the Indiana shore. (Note 61.*)

P. B. M. 633.—Near *Rock Haven, Meade County, Ky.*, at the top of the river bank, about 375 meters above the mouth of *Otter Creek, Ky.*, and opposite *Hughes Landing, Ind.* (Note 61.*)

P. B. M. 634.— $\frac{3}{4}$ mile above *Rock Haven* landing, *Meade County, Ky.*, on the second terrace of the river bank, and 15 meters below the Government light. (Note 61.*)

P. B. M. 635.—At *Rock Haven, Meade County, Ky.*, in dense willows at the foot of the river bank, and about 30 meters below the mouth of the creek. (Note 61.*)

P. B. M. 635 A.—At *Rock Haven, Meade County, Ky.*, a cross cut in the top of a ring bolt, about 30 meters below the mouth of the creek.

P. B. M. 636.—Near *Rock Haven, Meade County, Ky.*, opposite *Cedar Farm Landing, Ind.*, and about 200 meters above a large hay barn in a cedar grove on the Indiana shore. (Note 61.*)

P. B. M. 637.—Near *Dittoes Landing, Meade County, Ky.*, near the top of the river bank, opposite a point about 60 meters below a large barn on the Indiana shore, and about 725 meters above the Government light at the landing. (Note 61.*)

P. B. M. 638.—Near *Dittoes Landing, Meade County, Ky.*, at the top of the first terrace of the river bank, and about 725 meters above *Tobacco Landing, Ind.* (Note 61.*)

P. B. M. 639.—In *Meade County, Ky.*, about $\frac{1}{2}$ mile below *Tobacco Landing, Ind.*, at the top of the river bank, near the line of cultivation, about 350 meters above the mouth of a small branch on the Kentucky shore and opposite a red-rock cliff on the Indiana shore. (Note 61.*)

P. B. M. 640.—Near *Brandenburg, Meade County, Ky.*, at the top of the river bank near the line of cultivation, $\frac{3}{4}$ mile above *Millers Landing*, and about 300 meters above the one-story white frame house at the mouth of a creek on the Indiana shore. (Note 61.*)

P. B. M. 641.—Near *Brandenburg, Meade County, Ky.*, at the highest point of the river bank, between a frame house and a clump of large trees at the head of *Brandenburg Bar*, and about 200 meters above the Government light on the Indiana shore. (Note 61.*)

P. B. M. 642.—About 1 mile above *Brandenburg, Meade County, Ky.*, on the top of the river bank in cultivated ground, and about 300 meters below a one-story white frame house at the top of the bank on the Indiana shore. (Note 61.*) In 1910 it was found to be broken and unreliable.

P. B. M. 643.—At *Brandenburg, Meade County, Ky.*, in the courthouse yard, 9 meters north of the northwest corner of the courthouse. (Note 61.*)

P. B. M. 643 A.—At *Brandenburg, Meade County, Ky.*, a square, cut and lettered U. S. B. M., on the stone water table, 1.5 meters south of the northwest corner of the courthouse.

P. B. M. 644.—About 1 mile below *Brandenburg, Meade County, Ky.*, on the steep rocky river bank, and opposite a point about 475 meters above the mouth of *Buck Creek* on the Indiana shore. In 1910 the top of the bench mark was found to be cracked. (Note 61.*)

P. B. M. 645.—In *Meade County, Ky.*, about 300 meters above the landing at *Mauckport, Ind.*, on the top of the river bank at the edge of cultivation, about 125 meters below a small branch, and about 215 meters below an old frame house with a row of cedars in front of it. (Note 61.*)

P. B. M. 646.—In *Meade County, Ky.*, $\frac{3}{4}$ mile below *Mauckport, Ind.*, midway between the top of the first bank and the foot of the second bank above the river, and about 150 meters above the mouth of a small creek 5 feet wide. (Note 61.*)

P. B. M. 647.—In *Meade County, Ky.*, near *Mauckport, Ind.*, about 120 meters below the road at *Haynes Landing*, under a large elm tree at the foot of the second bank above the river. (Note 61.*)

P. B. M. 648.—In *Meade County, Ky.*, near *Mauckport, Ind.*, at the top of the river bank near the line of cultivation, about the center of *Haynes Bar*, about 550 meters above the mouth of a small creek, and opposite a point midway between *Haunted Hollow* and two frame houses at the mouth of the next hollow below on the Indiana shore. (Note 61.*)

P. B. M. 651.—In *Meade County, Ky.*, near *Mauckport, Ind.*, $\frac{2}{3}$ mile below the *Kosmos cement quarry*, at the top of the river bank, 18 meters north of an old frame house belonging to the *Kosmos Cement Co.*, about 30 meters above the mouth of a small branch. (Note 61.*)

P. B. M. 654.—Near *Crecelius, Meade County, Ky.*, near the top of the river bank in a gully made by a small field drain, about 6 meters below the line of cultivation, about 360 meters below a landing, about 240 meters above the mouth of a small branch, and opposite a point about 300 meters above the mouth of *Big Indian Creek* on the Indiana shore. (Note 61.*)

P. B. M. 655.—Near *Crecelius, Meade County, Ky.*, at the top of the river bank in the meadow at *Shaws Landing*, about 600 meters above *Swans Landing* on the Indiana shore, and about 25 meters below a hay barn. (Note 61.*)

P. B. M. 656.—Near *Crecelius, Meade County, Ky.*, about 6 meters below the foot of the second bank above the river, opposite a point about 490 meters above a white log house at the upstream side of a ravine on the Indiana shore. (Note 61.*)

P. B. M. 657.—Near *Crecelius, Meade County, Ky.*, at the top of the river bank, at the edge of a cultivated field about 30 meters above *Crecelius Landing*, and opposite *Kendles Landing* above *Upper Blue River Island*. (Note 61.*)

P. B. M. 658.—Near *Peckenpaugh, Meade County, Ky.*, 6 meters back from the top of the first bank above the river, about 60 meters below *Peckenpaugh landing*, and opposite the center of *Upper Blue River Island*. (Note 61.*)

P. B. M. 660.—In *Meade County, Ky.*, near *Leavenworth, Ind.*, 12 meters back from the top of the river bank, and opposite a point about 90 meters below the mouth of *Big Blue River*. (Note 61.*)

P. B. M. 661.—In *Meade County, Ky.*, near *Leavenworth, Ind.*, at the top of the river bank in a pear orchard, 8 meters above a yellow cottage belonging to Mrs. Higgins of New York, and nearly opposite *Leavenworth Wharf* on the *Indiana shore*. (Note 61.*)

P. B. M. 661A.—At *Leavenworth, Crawford County, Ind.*, at the northeast corner of *Frank and Nelson Streets*, on the foundation capstone, 3.7 meters east of the southwest corner of the *Merchants Hotel*. The mark is a chiseled square lettered "B. M."

High Water 1883.—At *Leavenworth, Crawford County, Ind.*, on the inside of the rear wall of *Shaw's old warehouse* on the east side of *Nelson Street*, and about 15 meters north of *Second Street*.

High Water 1884.—At *Leavenworth, Crawford County, Ind.*, in the same location as high water 1883.

P. B. M. 662.—In *Meade County, Ky.*, below *Leavenworth, Ind.*, in a dense willow growth at the top of the river bank about 300 meters below *Indian Hollow*. (Note 61.*)

P. B. M. 663.—In *Meade County, Ky.*, near *Leavenworth, Ind.*, at the top of the river bank near the line of cultivation and opposite a point about 360 meters below a log house on the *Indiana shore*. (Note 61.*)

P. B. M. 664.—Near *Crecelius, Meade County, Ky.*, at the top of the first terrace above the river in a growth of willows near the line of cultivation and opposite a point about 490 meters below a frame house on the *Indiana shore*. (Note 61.*)

P. B. M. 665.—Near *Crecelius, Meade County, Ky.*, at the top of the first terrace above the river, at the line of cultivation, and about 30 meters below a large beach tree below *Allens Landing*. (Note 61.*)

P. B. M. 666.—At *Crecelius, Meade County, Ky.*, at the top of the river bank about 60 meters below *Crecelius Landing*, about 50 meters below a small branch, and opposite *Schooners Point* on the *Indiana shore*. (Note 61.*)

P. B. M. 667.—Near *Crecelius, Meade County, Ky.*, on a rock about 4 by 5 feet about 400 meters below the light at *Schooners Point*. The mark is a square cut on the rock and lettered "U. S. B. M."

P. B. M. 668.—Near *Crecelius, Meade County, Ky.*, at the line of vegetation on the river bank, about 250 meters above a white house and about 300 meters above *Lyons Landing* on the *Indiana shore*. The mark is a square cut on a stone and lettered "USBM668."

P. B. M. 669.—Near *Cedar Branch, Meade County, Ky.*, at the top of the first terrace above the river, and about 300 meters below the *Government light* at *Cedar Branch*. (Note 61.*)

P. B. M. 670.—Near *Cedar Branch, Meade County, Ky.*, about 240 meters below *Holcrofts Landing, Ind.*, 2.1 meters above a large stone 6 by 15 by 25 feet on the river bank. (Note 61.*)

P. B. M. 671.—Near *Wolf Creek, Meade County, Ky.*, opposite *Cape Sandy Landing* on the *Indiana shore*, and about 200 meters below the mouth of a small creek. (Note 61.*)

P. B. M. 672.—Near *Wolf Creek, Meade County, Ky.*, at the top of the first terrace above the river near the line of cultivation, and opposite a point about 490 meters below the *Government light* at *Peepenpauhs Bar* on the *Indiana shore*. (Note 61.*)

P. B. M. 673.—Near *Wolf Creek, Meade County, Ky.*, at the top of the river bank at the edge of cultivation about 725 meters above *Wolf Creek Landing*. (Note 61.*)

P. B. M. 674.—Near *Wolf Creek, Meade County, Ky.*, about $\frac{1}{2}$ mile below *Wolf Creek Landing*, at the top of the river bank at the edge of cultivation and about 100 meters below the *Government light* in a tree. (Note 61.*)

P. B. M. 678.—In *Meade County, Ky.*, near *Alton, Ind.*, on the *Hardin farm* on the top of the river bank at the edge of cultivation, about 290 meters above the landing and 75 meters below a steamboat wreck near the *Kentucky shore*, and opposite a point 240 meters above a one-and-one-half story frame house above *Gaileys Landing* on the *Indiana shore*. (Note 61.*)

P. B. M. 679.—Near *Concordia, Meade County, Ky.*, at the highest point of the first bank above the river, about 120 meters above *Willards Landing*, and about 430 meters above *Rona Landing*. (Note 61.*)

P. B. M. 680.—Near *Concordia, Meade County, Ky.*, at the highest point of the river bank at the edge of a cultivated field, about 490 meters above a large barn on the *Indiana shore*, about 275 meters above a frame house in *Kentucky*, and opposite a deserted log house in *Indiana*. (Note 61.*)

P. B. M. 681.—Near *Concordia, Meade County, Ky.*, near the top of the river bank in a cottonwood grove about $\frac{1}{4}$ mile above *Boone Hollow Light*, and 18 meters back from the willow line. (Note 61.*)

P. B. M. 682.—Near *Concordia, Meade County, Ky.*, on a ledge in the stone quarry 1 mile above *Concordia Landing* and about 240 meters below a large barn on the *Indiana shore*. The mark is a square cut on the rock and lettered U. S. B. M. 682.

P. B. M. 683.—At *Concordia, Meade County, Ky.*, at the top of the bank on the south side of the first street below the landing, 1.8 meters east and 4.6 meters north of the northeast corner of an old frame hotel. (Note 61.*)

P. B. M. 684.—1 mile below *Concordia, Meade County, Ky.*, in a cornfield at the top of the river bank, about 200 meters below an old house and about $\frac{1}{4}$ mile above the *Government light*. (Note 61.*)

P. B. M. 685.—Near *Concordia, Meade County, Ky.*, at the top of the river bank at the edge of a cultivated field on *S. F. Burch's farm* at the head of *Flint Island*, about 450 meters below *Burch Landing* and about 240 meters above the line of vegetation on the island. (Note 61.*)

P. B. M. 686.—On *Flint Island, Meade County, Ky.*, at the foot of a steep bank on the island, about 125 meters above the *Government light* on a sycamore tree, about 280 meters above the dike at the foot of the island, and opposite a large barn on the *Indiana shore*. (Note 61.*)

P. B. M. 687.—On *Flint Island, Meade County, Ky.*, at the top of the river bank in a cultivated field, 60 meters below the Government light near the foot of the island, and about 275 meters above Blue Grass Landing. (Note 61.)*

P. B. M. 687A.—On *Flint Island, Meade County, Ky.*, about 240 meters below Blue Grass Landing and about $\frac{1}{4}$ mile below the Government light, on a large sandstone rock at the edge of vegetation. The mark is a square cut in the rock, and lettered U. S. B. M.

P. B. M. 688.—At *Burchs Landing, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, opposite a point about 90 meters above a large barn in a meadow on the Indiana shore, which is about 275 meters above the mouth of Oil Creek. (Note 61.)*

P. B. M. 689.—Near *Chenault, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, near three large cottonwood trees, and about 90 meters below the mouth of a creek on the Indiana shore, which is about 275 meters below Derby Landing, opposite the upper end of a detached hill below Derby Landing. (Note 61.)*

P. B. M. 690.—At *Chenault, Breckinridge County, Ky.*, on the second terrace above the river in a pasture field, about 450 meters below Chenault Landing, about 125 meters above a one-story cottage, 15 meters above a large walnut tree, 3.5 meters from a smaller walnut tree, and 1.8 meters back from the fence. (Note 61.)*

P. B. M. 691.—Near *Chenault, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, about 200 meters above Upper Chenault Light, and about 200 meters below a two-story frame house. (Note 61.)*

P. B. M. 692.—Near *Lahant, Breckinridge County, Ky.*, on the first terrace above the river at the edge of a cultivated field, 18 meters above Yellow Bank Creek. (Note 61.)*

P. B. M. 693.—Near *Lahant, Breckinridge County, Ky.*, on the first terrace above the river in a cottonwood grove opposite a point about 30 meters below the lower mouth of Poison Creek. (Note 61.)*

P. B. M. 694.—Near *Ammons, Breckinridge County, Ky.*, on the first terrace above the river in a cottonwood grove about 60 meters below Lower Chenault Light, and opposite a large frame house on the top of a hill on the Indiana shore. (Note 61.)*

P. B. M. 695.—Near *Ammons, Breckinridge County, Ky.*, on the first terrace above the river, 5 meters back from the edge of a cultivated field, about 210 meters above the mouth of Lick Run and 275 meters below a one-story frame cottage on the Indiana shore. (Note 61.)*

P. B. M. 696.—Near *Stephensport, Breckinridge County, Ky.*, at the top of the river bank, about 10 meters from the public road, 10 meters from a big rock, and about 250 meters below the Government light at the head of Stephensport Bend. (Note 61.)*

P. B. M. 697.—Near *Stephensport, Breckinridge County, Ky.*, half way between the edge of the river bank and the river road, about 500 meters above Upper Stephensport Landing, and about 560 meters above Sinking Creek. (Note 61.)*

P. B. M. 697 A.—At *Stephensport, Breckinridge County, Ky.*, on the northeast corner of the capstone of the north pedestal on the east side of the bridge over Sinking Creek. The mark is a chiseled square lettered U.S.B.M.

P. B. M. 698.—Below *Stephensport, Breckinridge County, Ky.*, near the foot of the second bank above the river at the end of a rock ledge about 40 meters above a small creek known as Barlows Branch. (Note 61.)*

P. B. M. 699.—Near *Addison, Breckinridge County, Ky.*, on the steep, wooded bank $\frac{2}{3}$ mile above Addison Landing and opposite a point about 250 meters below a white cottage surrounded by maple trees on the Indiana shore. (Note 61.)*

P. B. M. 700.—Near *Addison, Breckinridge County, Ky.*, at the top of the river bank at the edge of a meadow about 490 meters below Addison Landing, in front of a large frame house on the Kentucky side and opposite a large frame house on the Indiana shore. (Note 61.)*

P. B. M. 701.—At *Holt, Breckinridge County, Ky.*, in the edge of the meadow 6 meters back from the edge of the river bank, about 250 meters below a shanty boat on props on the Indiana shore, and nearly north of the store building on the Kentucky shore. (Note 61.)*

P. B. M. 702.—Near *Holt, Breckinridge County, Ky.*, 6 meters back from the top of the river bank in a cultivated field, near an isolated locust tree and opposite a point about 450 meters below a one-story log house on the upper side of a ravine on the Indiana shore. (Note 61.)*

P. B. M. 703.—Near *Holt, Breckinridge County, Ky.*, at the top of the river bank near the edge of a cultivated field, 15 meters above an isolated beech tree, and about 165 meters above Captain Smith's landing. (Note 61.)*

P. B. M. 704.—Near *Cloverport, Breckinridge County, Ky.*, at the edge of a cultivated field, about 250 meters below the mouth of Bull Creek. (Note 61.)*

P. B. M. 705.—Near *Cloverport, Breckinridge County, Ky.*, at the top of the river bank, near the roadside, about 875 meters below the Government light at Carters Landing. (Note 61.)*

P. B. M. 706.—Near *Cloverport, Breckinridge County, Ky.*, at the foot of a hillside about 90 meters above a rock ledge which is above the mouth of a creek. (Note 61.)*

P. B. M. 707.—At *Cloverport, Breckinridge County, Ky.*, at the foot of the middle bank above the river, about 100 meters above the mouth of Upper Creek, 7.8 meters from a 30-inch sycamore tree. (Note 61.)*

P. B. M. 707 A.—At *Cloverport, Breckinridge County, Ky.*, at the northwest corner of Second and Main Streets on the basement doorsill of the Masonic Temple. The mark is a chiseled square, lettered U. S.

High Water 1884.—At *Cloverport, Breckinridge County, Ky.*, at the corner of Second and Main Streets. The mark is a nail in the west wall of Fisher's drug store.

P. B. M. 708.—At *Cloverport, Breckinridge County, Ky.*, at the top of the river bank, 4.9 meters back from the fence line, 27 meters from the house owned by Jesse Keys, about 55 meters below an abandoned tippie, and 115 meters below the Government light. (Note 61.)*

P. B. M. 709.—Near *Cloverport, Breckinridge County, Ky.*, near the top of the river bank about 110 meters below the mouth of Fawcettes Creek, 2.7 meters from a 15-inch sycamore tree and 6.2 meters from a 20-inch cottonwood. (Note 61.)*

P. B. M. 710.—Near *Cloverport, Breckinridge County, Ky.*, 8 meters back from the top of the river bank near the foot of the railroad embankment, about 180 meters below a log and tie landing, and 60 meters above a stone culvert on the Louisville, Henderson & St. Louis Railway. (Note 61.)*

P. B. M. 711.—Near *Skillman, Hancock County, Ky.*, at the top of the river bank in a cultivated field about 275 meters below Groves Landing on the Indiana shore, 3.5 meters from a 3-inch elm tree, and 4.7 meters from a 5-inch locust. (Note 61.)*

P. B. M. 712.—Near *Skillman, Hancock County, Ky.*, at the top of the river bank in a cultivated field, about 450 meters below a large tobacco barn and 550 meters above the Government light on the Indiana shore. (Note 61.)*

P. B. M. 713.—Near *Skillman, Hancock County, Ky.*, about 10 meters from the foot of the second bank above the river, about 25 meters above a large hay barn, 60 meters below a ravine, 950 meters above Skillman Landing, and opposite a frame house with a lone cedar in front of it on the Indiana shore. (Note 61.)*

P. B. M. 714.—Near *Skillman, Hancock County, Ky.*, at the foot of the second bank above the river, about 300 meters below the Government light at Millstone Landing and about 335 meters above a two-story frame house with a row of cedars in front of it. (Note 61.)*

P. B. M. 715.—In *Hancock County, Ky.*, opposite *Deer Creek, Ind.*, on the second terrace above the river in the yard surrounding the residence belonging to the Hogamon brothers and occupied by J. Matingly, and opposite a point about 60 meters below the mouth of Deer Creek. (Note 61.)*

P. B. M. 715 A.—In *Hancock County, Ky.*, opposite *Deer Creek, Ind.*, at the top of the river bank about 50 meters below the house occupied by J. Matingly, on the corner of a line stone between the farms of Hogamon Bros. and Mrs. Eliza Webb. The mark is a chiseled square lettered "U. S."

P. B. M. 716.—Near *Landis Landing, Hancock County, Ky.*, on the second terrace above the river about 8 meters back from the edge of the bank, about 250 meters below a barn on the Eliza Webb farm and 425 meters above a house on the same farm occupied by a Mrs. Robbins. (Note 61.)*

P. B. M. 717.—Near *Hawesville, Hancock County, Ky.*, at the top of the river bank, 4.1 meters toward the river from the center line of the road opposite a point about 250 meters below Pauline Landing on the Indiana shore. (Note 61.)*

P. B. M. 717 A.—Near *Hawesville, Hancock County, Ky.*, on the capstone at the northwest corner of the east abutment of the bridge over Indian Creek about 90 meters from its mouth. The mark is a chiseled square lettered "U. S."

P. B. M. 718.—Near *Hawesville, Hancock County, Ky.*, on the first terrace above the river about 25 meters from the top of the first bank and 20 meters from the foot of the second, about 90 meters below a storeroom owned by a Mr. Price and 180 meters above a house occupied by him. The mark is a cut on a cast-iron cap. (Note 61.)*

P. B. M. 719.—Near *Hawesville, Hancock County, Ky.*, at the foot of the bank about 13 meters from the railroad, about 95 meters below trestle 82 $\frac{3}{4}$, and about 35 meters above a tool house of the Louisville, Henderson & St. Louis Railway. (Note 61.)*

P. B. M. 720.—At *Hawesville, Hancock County, Ky.*, about 50 meters from the railroad, 43.8 meters from a nail in a post projecting 2 feet above the ground at the corner of the Hawesville Plain Dealer newspaper office, about 35 meters from the concrete wall of the ice plant, and about the same distance from the northwest corner of the electric light plant. (Note 61.)*

P. B. M. 720 A.—At *Hawesville, Hancock County, Ky.*, at the intersection of the Louisville, Henderson & St. Louis Railway and Cool Spring Branch, about 10 meters below the railway, 25 meters below the creek, and 50 meters above the station. The mark is an arrow pointing north on a United States Geological Survey meridian monument.

U. S. G. S. 422.—At *Hawesville, Hancock County, Ky.*, on the southeast corner of the courthouse. The mark is a cross on a metallic template.

P. B. M. 721.—Near *Hawesville, Hancock County, Ky.*, at the foot of the second bank above the river, about 8 meters from the road, 150 meters below a two-story yellow frame house, and opposite the chair factory. at Cannelton, Ind. (Note 61.)*

P. B. M. 722.—Near *Hawesville, Hancock County, Ky.*, 1 mile above Tell City, Ind., 8 meters from the foot of the second bank above the river and about 15 meters from the road, 40 meters above a brick house owned and occupied by C. T. Duncan, and 150 meters below a frame house owned and occupied by W. Zuelly. (Note 61.)*

P. B. M. 723.—Near *Hawesville, Hancock County, Ky.*, 3.7 meters from the foot of the river bank, opposite a point about 95 meters below a brick house owned and occupied by Henry Mason, and about 50 meters above the lower factory of the United States Hame Co., at Tell City, Ind. (Note 61.)*

P. B. M. 724.—At *Beachams Landing, Hancock County, Ky.*, about 3 meters from the foot of the river bank, about 60 meters below the landing, and about 20 meters above a two-story frame house occupied by a Mr. Longuest, and opposite the smokestack of the brickyard in Tell City, Ind. (Note 61.)*

P. B. M. 725.—In *Hancock County, Ky.*, above *Troy, Ind.*, about 2.5 meters from the foot of the river bank, and about 12 meters from the top, and about 20 meters above a vacant two-story frame house owned by J. Q. Adams. (Note 61.)*

P. B. M. 726.—In *Hancock County, Ky.*, above *Troy, Ind.*, about 210 meters above the mouth of Henderson Creek in the yard surrounding the residence of H. Gardener, about 12 meters from the top of the river bank, 28.1 meters from the northeast corner of the house and 25.1 meters from the southeast corner. (Note 61.)*

P. B. M. 727.—In *Hancock County, Ky.*, above *Troy, Ind.*, about 12 meters from the top of the second terrace above the river, on the farm of Harvey Meyers, about 45 meters above the one-story frame residence of Mr. Bolington, and opposite a two-story stone house owned by John Fitch, of *Troy, Ind.* (Note 61.)*

P. B. M. 728.—In *Hancock County, Ky.*, below *Troy, Ind.*, 15 meters from the top of the second bank above the river on the farm of Mr. Hodges, about 15 meters above the line of Mr. Ligh's farm, and opposite a point about 275 meters below the Government light on the Indiana shore. The mark is the center of a cast-iron pin.

P. B. M. 728 A.—In *Hancock County, Ky.*, below *Troy, Ind.*, about 5 meters east of P. B. M. 728. The mark is a seat cut on a 30-inch cottonwood tree.

P. B. M. 729.—Near *Lewisport, Hancock County, Ky.*, at the top of the river bank on the farm of S. P. Emick, about 10 meters south of a warehouse, about $\frac{1}{4}$ mile above the residence of Mr. Emick, and nearly opposite the mouth of Crooked Creek on the Indiana shore. (Note 61.)*

P. B. M. 730.—Near *Lewisport, Hancock County, Ky.*, about $\frac{3}{4}$ mile below the mouth of the slough that forms the upper end of Corn Island, on the first terrace above the river, about 18 meters from the top and 35 meters above the mouth of a field drain. (Note 61.)*

P. B. M. 731.—Near *Lewisport, Hancock County, Ky.*, on the first terrace above the river, about 25 meters from the foot of the second bank and 35 meters from the top of the first, near the head of Andersons Bar, opposite a point about 240 meters below a barn on the Indiana shore and 300 meters above another barn on that shore. (Note 61.)*

P. B. M. 732.—Near *Lewisport, Hancock County, Ky.*, on the second terrace above the river, about 12 meters from the edge of the bank, and opposite the house owned and occupied by Mrs. Henderson, near Anderson Bar. (Note 61.)*

P. B. M. 733.—Near *Lewisport, Hancock County, Ky.*, on the first terrace above the river, about 15 meters from the top, on the farm of Mrs. Sallie E. Parker, and opposite a point about 10 meters above the house occupied by Mr. Lambert, and opposite another point 120 meters above a barn on the Indiana shore. (Note 61.)*

P. B. M. 733 A.—At *Lewisport, Hancock County, Ky.*, near the river bank on the south side of Main Street, in the fifth course of brick above the water table on the east face of the northeast corner of the brick residence of I. B. Hayden. The mark is a horizontal cut lettered "U. S. B. M."

P. B. M. 734.—At *Lewisport, Hancock County, Ky.*, about 120 meters below the Government light, 6 meters from the foot of the river bank, and opposite a point 4 meters above the one-story frame house owned and occupied by a Mrs. Miller and 9 meters below the vacant one-story frame house owned by Mrs. Harper. (Note 61.)*

P. B. M. 735.—Near *Lewisport, Hancock County, Ky.*, about 30 meters from the top of the river bank on the farm of Lee Holland, about 50 meters above the line fence between that farm and the one belonging to Malinda Holland, and opposite a point about 30 meters above the residence of Lee Holland. (Note 61.)*

P. B. M. 736.—Near *Lewisport, Hancock County, Ky.*, 27 meters from the top of the river bank on the farm of H. Burch, opposite a point about 120 meters above the residence of Mr. Grubel and 90 meters above the barn. (Note 61.)*

P. B. M. 737.—Near *Lewisport, Hancock County, Ky.*, about 1 mile above the mouth of Blackford Creek, on the farm of Capt. Grammond, about 18 meters from the top of the river bank, and 110 meters below the house occupied by F. Poll. (Note 61.)*

P. B. M. 738.—In *Hancock County, Ky.*, opposite *Grand View, Ind.*, on the farm of Samuel Sheridan, about 9 meters from the top of the river bank, 30 meters above the mouth of Blackford Creek, about 120 meters above the residence owned and occupied by Robt. Blunt, and opposite a point about 30 meters below the mouth of Little Sandy Creek on the Indiana shore. (Note 61.)*

* P. B. M. 739.—In *Daviess County, Ky.*, near *Grand View, Ind.*, about 1 mile below the mouth of Blackford Creek, on the farm of James Haywood, about 450 meters from the house occupied by Mr. Hall, and opposite a point about 60 meters above a two-story white house on the Indiana shore. (Note 61.)*

P. B. M. 740.—In *Daviess County, Ky.*, near *Rockport, Ind.*, about 2 miles below the mouth of Blackford Creek on the farm of J. Mathews, 81 meters from the line between this farm and that of Mary Dixon, and opposite a point about 150 meters above the mouth of Honey Creek on the Indiana shore. (Note 61.)*

P. B. M. 741.—In *Daviess County, Ky.*, $1\frac{1}{2}$ miles above *Rockport, Ind.*, on the farm of W. Johnson, in the yard surrounding the residence of R. P. Pool, about 5 meters beyond the county road, 5 meters from the northeast corner of the house, and 16.1 meters from the northwest corner. (Note 61.)*

P. B. M. 742.—In *Daviess County, Ky.*, near *Rockport, Ind.*, on the farm of Lawson Green, 6 meters beyond the county road, about 15 meters from an old well near the road, and 90 meters from the house occupied by Elijah Beard. (Note 61.)*

P. B. M. 743.—In *Daviess County, Ky.*, near *Rockport, Ind.*, on the farm of Oscar Muckols, about 215 meters from the house occupied by L. Pool, and 40.2 meters from the line fence between the farms of O. Muckols and S. E. Muckols. (Note 61.)*

P. B. M. 744.—At *Iceland Landing, Daviess County, Ky.*, at the top of the river bank at the edge of a field on the farm of George Taylor, about 60 meters above Muddy Gut Creek. (Note 61.)*

P. B. M. 745.—In *Daviess County, Ky.*, below *Rockport, Ind.*, about $\frac{3}{4}$ mile above the root of the dike at the mouth of Puppy Creek, on the farm of George Taylor, 3 meters from the top of the river bank, and 60 meters above the line fence between the farms of Mr. Taylor and Mr. Galvin. (Note 61.*)

P. B. M. 746.—In *Daviess County, Ky.*, below *Rockport, Ind.*, 120 meters above Puppy Creek on the Galvin farm, 486 meters below the head of the dike, about 25 meters in front of Puppy Creek, and 7.9 meters from a double sycamore tree. (Note 61.*)

P. B. M. 747.—Near *Owensboro, Daviess County, Ky.*, on the farm of W. S. Hawes, about 220 meters above the line fence between the farms of W. S. Hawes and Mrs. M. Young, 9.0 meters from a 5-inch cottonwood, 3.7 meters from a 4-inch cottonwood, and 2.9 meters from a 5-inch one. (Note 61.*)

P. B. M. 749.—Near *Owensboro, Daviess County, Ky.*, opposite a point 200 meters below the head of Yellow Bank Island and directly opposite a barn facing northeast and southwest on the Indiana shore. (Note 61.*)

P. B. M. 750.—Near *Owensboro, Daviess County, Ky.*, in the sandy slope about 185 meters below the Government light on the Kentucky shore. (Note 61.*)

P. B. M. 751.—Near *Owensboro, Daviess County, Ky.*, about 380 meters below the upper incline of the Glenmore Distillery, at the top of the river bank, and 70.6 meters to northwest corner of a house. (Note 61.*)

P. B. M. 752.—At *Owensboro, Daviess County, Ky.*, on the first slope above the river in the willows about 135 meters above the Owensboro wharf and 120 meters below the brick sewer. (Note 61.*)

U. S. G. S. 396.—At *Owensboro, Daviess County, Ky.*, in the northeast corner of the courthouse yard. The mark is a copper plate set in stone and lettered "U. S. Geog. Survey."

H. W. 1884.—At *Owensboro, Daviess County, Ky.*, at the southwest corner of St. Ann and Water Streets. The mark is a stone 18 inches square, lettered "In memory of High Water, Feb. 18th, 1883."

Water Gauge.—At *Owensboro, Daviess County, Ky.* The mark is the zero of the gauge.

P. B. M. 753.—Near *Owensboro, Daviess County, Ky.*, on the slope above the river about 8 meters back from the willow line, and 30 meters above the Henning Distillery incline. (Note 61.*)

P. B. M. 754.—Near *Owensboro, Daviess County, Ky.*, on the first slope above the river, 5 meters back from the edge of the willows, about 45 meters below the incline and directly opposite the point where the willows end on the right bank. (Note 61.*)

P. B. M. 755.—Near *Owensboro, Daviess County, Ky.*, 6 meters back from the top of the river bank in a cultivated field, and about 150 meters below a large barn. (Note 61.*)

P. B. M. 756.—Near *Little Hurricane Island, Daviess County, Ky.*, on top of the river bank at the tree line and about 60 meters above the vegetation at the upper end of the island. (Note 61.*)

P. B. M. 757.—Near *Little Hurricane Island, Daviess County, Ky.*, back of the island about 1 mile below the bend, on the slope about 5 meters from the top of the bank and the road, and 120 meters above a small frame house. (Note 61.*)

P. B. M. 758.—Near *Little Hurricane Island, Daviess County, Ky.*, about 18 meters from the top of the river bank in a cultivated field back of the island, about 300 meters above a farm house with cedar trees in the yard. (Note 61.*)

P. B. M. 759.—Near *Little Hurricane Island, Daviess County, Ky.*, 5 meters from the top of the river bank in a cultivated field about 300 meters above the Government light on the other shore. (Note 61.*)

P. B. M. 760.—Near *French Island, Daviess County, Ky.*, on the wooded slope 6 meters from the edge of cultivation, about 450 meters above the upper end of the island and about 400 meters above Government Light No. 350. (Note 61.*)

P. B. M. 761.—Near *French Island, Daviess County, Ky.*, about 11 meters back from the top of the river bank in a cultivated field, about $\frac{1}{3}$ mile below the Eagle Distillery and Griscoms Landing, and 14 meters below a fence line. (Note 61.*)

P. B. M. 762.—Near *French Island, Daviess County, Ky.*, in a cultivated field 15 meters back from the top of the river bank, about 90 meters above a large tree in the field, and 600 meters above the foot of Upper French Island. (Note 61.*)

P. B. M. 763.—Near *French Island, Daviess County, Ky.*, in a cultivated field about $\frac{1}{2}$ mile above the Government light on the Kentucky shore, 12.2 meters south of the northwest corner of a fisherman's shack at the top of the river bank, and 9.9 meters from the southwest corner. (Note 61.*)

P. B. M. 764.—Near *French Island, Daviess County, Ky.*, in a cultivated field about 30 meters from the edge of cultivation, about 150 meters below the foot of the island, and 30 meters above a lone sycamore tree at the edge of the bank. (Note 61.*)

P. B. M. 765.—Near *French Island, Daviess County, Ky.*, on the first terrace above the river among large trees about 12 meters below the edge of cultivation, and about 250 meters below the Government light on the other shore. (Note 61.*)

P. B. M. 766.—Near *French Island, Daviess County, Ky.*, on the first terrace above the river among willow trees, about 9 meters from the edge of cultivation and 250 meters above a large two-story frame house on the other shore. (Note 61.*)

P. B. M. 767.—Near *Carlinburg, Henderson County, Ky.*, $1\frac{1}{2}$ miles above Jones Landing, at the edge of cultivation at the top of the bank and opposite a point half way between two frame houses on the other shore. (Note 61.*)

P. B. M. 768.—Near *Scuffletown, Henderson County, Ky.*, about 715 meters above Jones Landing, on the slope above the river, about 15 meters from the edge of cultivation, 75 meters above a one-story log cabin, and 60 meters below a floating light. (Note 61.*)

P. B. M. 769.—Near *Scuffletown, Henderson County, Ky.*, $\frac{1}{2}$ mile below Jones Landing, on the slope below the river bank, and $\frac{1}{2}$ mile above a floating light. (Note 61.)*

P. B. M. 771.—Near *Scuffletown, Henderson County, Ky.*, about $1\frac{3}{4}$ miles above Newburg, Ind., at the top of the slope above the river, 15 meters below a road, in front of an old tobacco barn, 30 meters above a one-story log house, and 120 meters above the Government light on the other bank. (Note 61.)*

P. B. M. 773.—Near *Scuffletown, Henderson County, Ky.*, on the terrace above the river among the trees and opposite a point about 60 meters below the four-story brick power house at Newburg, Ind. (Note 61.)*

P. B. M. 777.—Near the mouth of *Green River, Henderson County, Ky.*, about 135 meters below the foot of the dike, at the top of the slope, 5 meters from the edge of cultivation, about 60 meters below a large cornerib, and opposite a point about 120 meters below the Government light on the other shore. (Note 61.)*

P. B. M. 778.—About $\frac{2}{3}$ mile above the mouth of *Green River, Henderson County, Ky.*, on the top of the slope at the edge of cultivation, and opposite a frame house on the other shore. (Note 61.)*

P. B. M. 779.—About 300 meters below the mouth of *Green River, Henderson County, Ky.*, opposite a point about 150 meters above Atkins Landing on the Indiana shore, and at the top of the slope above the river among willow trees. (Note 61.)*

P. B. M. 780.—In *Henderson County, Ky.*, near *Evansville, Ind.*, among trees at the top of the river bank, 8 meters from the edge of cultivation and 30 meters above an old log cabin on the bank. (Note 61.)*

P. B. M. 781.—In *Henderson County, Ky.*, near *Evansville, Ind.*, at the top of the river bank among the trees, 9 meters from the edge of cultivation, and 500 meters below the Government light on the Kentucky shore. (Note 61.)*

P. B. M. 782.—In *Henderson County, Ky.*, near *Evansville, Ind.*, on the first terrace above the river among the small willows about 1.5 meters above the lower end of the incline of the Illinois Central Railroad. (Note 61.)*

P. B. M. 783.—In *Henderson County, Ky.*, near *Evansville, Ind.*, in a cultivated field about 75 meters back from the river bank, and 150 meters above a one-and-one-half-story frame house. (Note 61.)*

P. B. M. 784.—In *Henderson County, Ky.*, near *Evansville, Ind.*, about 180 meters back from the top of the river bank in the yard surrounding a one-and-one-half-story frame house, 14.8 meters from the southeast corner of the house, and 8.7 meters from the northeast corner. (Note 61.)*

P. B. M. 785.—In *Henderson County, Ky.*, near *Evansville, Ind.*, in cultivated ground about 40 meters back from the top of the river bank, and about 15 meters below a clump of trees, formerly Halls Bayou. (Note 61.)*

P. B. M. 786.—In *Henderson County, Ky.*, near *Evansville, Ind.*, in a cultivated field about 18 meters back from the top of the river bank, about 15 meters below the root of the center dike, 500 meters below the Government light on the Kentucky shore, and 600 meters above the Evansville water works. (Note 61.)*

P. B. M. 787.—In *Henderson County, Ky.*, near *Evansville, Ind.*, among the trees on the first terrace above the river, 15 meters above the dike, and directly opposite the wharf at Evansville. (Note 61.)*

P. B. M. 788.—In *Henderson County, Ky.*, near *Evansville, Ind.*, on the crest of a knoll among willow trees directly opposite the road to the river below the lower sawmill on the Indiana shore. (Note 61.)*

P. B. M. 789.—In *Henderson County, Ky.*, near *Evansville, Ind.*, at the top of the river bank at the edge of a cultivated field, on the east side of a road, and 3.4 meters directly behind Government Light No. 366. (Note 61.)*

P. B. M. 790.—In *Henderson County, Ky.*, near *Evansville, Ind.*, at the foot of the river bank, about 360 meters from a barn. (Note 61.)*

High Water Marks.—At *Evansville, Vanderburg County, Ind.*, at the corner of Sycamore and Water Streets. The marks are cuts in the curbstone showing height of water on February 19, 1883, and February 19, 1884.

U. S. G. S. 394.—At *Evansville, Vanderburg County, Ind.*, in the stone sill on the east side of the customhouse. The mark is a copper plate marked "394 feet Vin. Datum."

P. B. M. 791.—At *Dutch Bend, Henderson County, Ky.*, about 180 meters back from the top of the river bank, and directly in front of a one-story frame house to the right of the road running back from the top of the bank, 12.0 meters from one corner of the house, 5.8 meters from another corner, and 13.4 meters from the terrace. (Note 61.)*

P. B. M. 792.—At *Dutch Bend, Henderson County, Ky.*, among the willows on the terrace above the river, 15 meters from the edge of cultivation, opposite a point about $\frac{1}{2}$ mile below the Government light and 250 meters above a large barn on the Indiana shore. (Note 61.)*

P. B. M. 793.—Near *Henderson, Henderson County, Ky.*, about 2 miles above Henderson Towhead at the top of the slope of the river bank among the willows, about 8 meters from the edge of cultivation, and opposite a point about 60 meters below a two-story frame house and barn on the Indiana shore. (Note 61.)*

P. B. M. 794.—Near *Henderson, Henderson County, Ky.*, about 1 mile above Henderson Towhead, among the trees at the top of the slope opposite the upper end of a row of tall trees on the Indiana shore. (Note 61.)*

P. B. M. 795.—Near *Henderson, Henderson County, Ky.*, opposite Henderson Towhead, about 18 meters back from the top of the river bank on the lower bank of a small branch and hog wallow. (Note 61.)*

P. B. M. 796.—Near *Henderson, Henderson County, Ky.*, about $\frac{3}{4}$ mile above the Henderson waterworks, beneath the top of the river bank, about 60 meters below an old incline, and 30 meters below a small ravine. (Note 61.)*

P. B. M. 797.—Near *Henderson, Henderson County, Ky.*, near the creek below the Henderson waterworks. (Note 61.)*

Reference Point.—At *Henderson, Henderson County, Ky.*, on the stone flagging at the upper end of the wharf at the foot of Second Street. The mark is an old survey point and is a triangle lettered "U. S."

Old B. M.—At *Henderson, Henderson County, Ky.*, on the stone flagging at the lower end of the wharf at the foot of Second Street. The mark is a chiseled square lettered "U. S. B. M."

High Water 1884.—At *Henderson, Henderson County, Ky.*, at the southwest corner of Second and Water Streets. The mark is a spike in the wall of an old brick building.

P. B. M. 797 A.—At *Henderson, Henderson County, Ky.*, on the foundation stone at the south side of the first pier of the Henderson railroad bridge. The mark is a seat cut on the top of the stone and lettered "U. S. B. M."

P. B. M. 798.—At *Henderson, Henderson County, Ky.*, at the top of the slope of the paved wharf about 30 meters north of Second Street and directly opposite the mouth of the alley. (Note 61.)*

P. B. M. 799.—Near *Henderson, Henderson County, Ky.*, 1 mile below the Henderson wharf, in cultivated ground about 18 meters back from the top of the first bank above the river, about 40 meters below a small ravine and 150 meters below a large brick warehouse. (Note 61.)*

P. B. M. 800.—Near *Henderson, Henderson County, Ky.*, on cultivated ground on the top of the river bank, about 15 meters from the edge of cultivation and about 180 meters below the upper end of Henderson Island. (Note 61.)*

P. B. M. 801.—Near *Henderson, Henderson County, Ky.*, behind Henderson Island at the top of the river bank in cultivated ground, about 8 meters back from the edge of cultivation and 55 meters above the bank of Canoe Creek. (Note 61.)*

P. B. M. 802.—Near *Henderson, Henderson County, Ky.*, below Henderson Island, at the top of the river bank, about 12 meters back from the edge in a clump of small trees between two cultivated fields and about 250 meters below the Government light on the Kentucky shore. (Note 61.)*

P. B. M. 803.—Near *McDonalds Landing, Henderson County, Ky.*, 1 mile above Lock and Dam No. 48, in an orchard about 12 meters back from the top of the river bank and cultivated field, about 90 meters below the Government light and 75 meters above a hedge fence. (Note 61.)*

P. B. M. 805.—Near *McDonalds Landing, Henderson County, Ky.*, 1 mile below Lock and Dam No. 48, in a cultivated field about 60 meters back from the top of the river bank, about 300 meters below the Government light on the Kentucky shore and halfway between two small frame houses. (Note 61.)*

P. B. M. 806.—About $\frac{1}{2}$ mile above *McDonalds Landing, Henderson County, Ky.*, in a thick jungle, about 40 meters back from the top of the river bank and opposite a point about 90 meters below a large barn on the Indiana shore. (Note 61.)*

P. B. M. 807.—Near *Cypress Bend, Henderson County, Ky.*, about 60 meters back from the top of the river bank among some large trees, about 15 meters below a large barn and the ruins of an old house. (Note 61.)*

P. B. M. 808.—Near *Cypress Bend, Henderson County, Ky.*, at the head of the bend about 45 meters back from the willow line on the bank of the river and about 120 meters above a house and barn on the other shore. (Note 61.)*

P. B. M. 809.—In *Cypress Bend, Henderson County, Ky.*, among the small trees about 30 meters back from the willow line at the river bank, directly opposite a large house and barn and the Government light on the Indiana shore. (Note 61.)*

P. B. M. 810.—In *Henderson County, Ky.*, about 1 mile above *West Franklin, Ind.*, at the top of the river bank in a cultivated field, about 8 meters back from the edge of cultivation and about 450 meters above a stone crusher on the Indiana shore. (Note 61.)*

P. B. M. 811.—In *Henderson County, Ky.*, about 150 meters below the landing at *West Franklin, Ind.*, at the top of the slope from the river in a cultivated field, 8 meters back from the edge of cultivation. (Note 61.)*

P. B. M. 812.—Near *Diamond Island, Henderson County, Ky.*, about $\frac{1}{2}$ mile below the head of the island, at the top of the slope from the river in a cultivated field, 6 meters back from the edge of cultivation. (Note 61.)*

P. B. M. 813.—Near *Diamond Island, Henderson County, Ky.*, 12 meters back from the top of the river bank in a cultivated field at a turn in the road, 90 meters above a large barn, and about 300 meters above the Government light on the Kentucky shore. (Note 61.)*

P. B. M. 815.—Near *Diamond Island, Henderson County, Ky.*, at the top of the slope from the river among trees about 9 meters from the edge of cultivation and about 300 meters above the Government light which is on a tree at the foot of the island. (Note 61.)*

P. B. M. 816.—Near *Diamond Island, Henderson County, Ky.*, at the top of the slope of the river bank among the trees about 30 meters from the edge of cultivation and about 180 meters below the foot of Diamond Island Towhead. (Note 61.)*

P. B. M. 817.—Near *Alzey, Henderson County, Ky.*, $\frac{3}{4}$ mile above Smiths Landing, at the top of the first slope of the river bank among the trees and about 150 meters above a store and a group of houses. (Note 61.)*

P. B. M. 818.—Near *Alzey, Henderson County, Ky.*, below Smiths Landing, at the edge of the road 12 meters back from the top of the river bank, 145 meters below Government light No. 378, on the Kentucky shore. (Note 61.)*

P. B. M. 819.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, at the top of the river bank among the trees 180 meters above New York Landing. (Note 61.)*

P. B. M. 820.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, about 0.9 mile below New York Landing, among the trees at the top of the slope from the river, about 180 meters below a scale house at a turn in the road. (Note 61.)*

P. B. M. 821.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, $\frac{1}{4}$ mile below Whitmans Landing and opposite the head of Towhead Bar, at the top of the river bank among the trees. (Note 61.)*

* See pp. 162-166.

P. B. M. 822.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, opposite the foot of Mount Vernon Towhead among the trees on the long slope from the river. (Note 61.*)

P. B. M. 823.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, opposite the wharf at Mount Vernon and directly back of a ferry landing on the Kentucky shore among the willows at the top of the slope from the river. (Note 61.*)

P. B. M. 824.—In *Henderson County, Ky.*, near *Mount Vernon, Ind.*, about 250 meters above Hegermans Landing and opposite a point 300 meters below a one-story red frame house on the Indiana shore, at the top of the slope from the river among the trees and 8 meters from the head of cultivation. (Note 61.*)

P. B. M. 825.—In *Henderson County*, near *Slim Island, Union County, Ky.*, on the slope above the river among the trees, 15 meters from the line of cultivation and about 880 meters above the line between Henderson and Union Counties. (Note 61.*)

P. B. M. 826.—Near *Slim Island, Union County, Ky.*, at the top of the river bank in a cultivated field, 8 meters from the edge of the road, 30 meters above a turn in the road and about 250 meters above a large barn and windmill on Slim Island. (Note 61.*)

P. B. M. 827.—Near *Slim Island, Union County, Ky.*, in cultivated land, 12 meters back from the top of the river bank and opposite the center of the island. (Note 61.*)

P. B. M. 828.—Near *Slim Island, Union County, Ky.*, at the top of the slope from the river among the weeds and willows 8 meters from the edge of cultivation and about $\frac{1}{2}$ mile above the Government light at the foot of the island. (Note 61.*)

P. B. M. 829.—Near *Slim Island, Union County, Ky.*, opposite the head of Slim Island Towhead and about $\frac{2}{5}$ mile below the Government light at the foot of the island, at the top of the river bank in cultivated ground. (Note 61.*)

P. B. M. 830.—Near *Slim Island, Union County, Ky.*, 250 meters below the foot of Slim Island Towhead, at the top of the slope from the river, among the trees 3 meters from the edge of cultivation. (Note 61.*)

P. B. M. 831.—Near *Uniontown, Union County, Ky.*, at the upper end of Mississippi Bend, at the top of the slope from the river among the willows, 6 meters from the edge of cultivation and opposite a point 90 meters above a barn and clump of trees on the Indiana shore. (Note 61.*)

P. B. M. 833.—Near *Uniontown, Union County, Ky.*, above Poker Point, in cultivated ground, 30 meters back from the edge of the river bank and about 45 meters above a frame shack. (Note 61.*)

P. B. M. 834.—Near *Uniontown, Union County, Ky.*, in cultivated ground, 30 meters back from the edge of the river bank and opposite a point about 300 meters above a two-story frame house on the Indiana shore. (Note 61.*)

P. B. M. 835.—Near *Uniontown, Union County, Ky.*, about 600 meters above the landing, among thick willows on a slight slope about 90 meters above a small creek. (Note 61.*)

P. B. M. 836.—Near *Uniontown, Union County, Ky.*, on the wooded slope above the river, about 15 meters in front of the boiler shed of the Union County Distillery. (Note 61.*)

P. B. M. 837.—Near *Uniontown, Union County, Ky.*, about $\frac{1}{2}$ mile above the central point of Lower Highland Rocks, in a cultivated field on the slope above the river, and about 20 meters below an old burned snag. (Note 61.*)

P. B. M. 838.—Near *Wabash Island, Union County, Ky.*, among the trees on the slope above the river, about 20 meters from the edge of cultivation, and $\frac{2}{3}$ mile above the Government light at the head of Wabash Island. (Note 61.*)

P. B. M. 839.—Near *Wabash Island, Union County, Ky.*, about 250 meters above the head of the island, among the trees on the slope above the river, and 15 meters from the edge of cultivation. (Note 61.*) The mark was recovered in 1911, and was then $2\frac{1}{2}$ feet underground.

P. B. M. 840.—Near *Wabash Island, Union County, Ky.*, at the top of the slope from the river among willows, 10 meters from the edge of cultivation, 150 meters above a two-story frame house on the shore of Wabash Island, and 300 meters below Lost Creek. (Note 61.*)

P. B. M. 841.—Near *Wabash Island, Union County, Ky.*, on the first terrace above the river among the trees directly opposite a two-story frame house on the island. (Note 61.*)

P. B. M. 842.—Near *Wabash Island, Union County, Ky.*, about $\frac{1}{4}$ mile below the Government light at the foot of the island, at the top of the slope from the river, among the trees, 15 meters from the edge of a cultivated field. (Note 61.*)

P. B. M. 843.—About $1\frac{1}{4}$ miles below the foot of *Wabash Island, Union County, Ky.*, and about 600 meters above the first bare bank on the Kentucky shore, among the trees on the first terrace above the river. (Note 61.*)

P. B. M. 844.—Near *Raleigh, Union County, Ky.*, in a cultivated field, 30 meters back from the top of the river bank, and 11 meters above a row of dead trees that probably form a property line. (Note 61.*)

P. B. M. 845.—At *Raleigh, Union County, Ky.*, about 40 meters back from the top of the river bank, half way between the frame store building with the Government light on it, and the barn 30 meters distant. (Note 61.*)

P. B. M. 846.—Near *Browns Island, Union County, Ky.*, opposite the head of the island, at the top of the river bank, at the edge of the road, at the upper end of a clump of large trees, and about 300 meters below a frame house at a turn of the road. (Note 61.*)

P. B. M. 847.—Near *Browns Island, Union County, Ky.*, below the foot of the island, in a cultivated field at the top of the river bank, 5 meters back from the edge of a road, and about 90 meters below the Government light. (Note 61.*)

P. B. M. 848.—In *Union County, Ky.*, opposite *Shaunectown, Ill.*, at the top of the slope of the river bank, at the lower edge of the road, and about 90 meters above a frame house. (Note 61.*)

- P. B. M. 849.—In *Union County, Ky.*, opposite *Shawneetown, Ill.*, among thick willows on the first terrace above the river, 365 meters below the ferry landing, and directly opposite the *Riverside Hotel* at *Shawneetown*. (Note 61.)*
- P. B. M. 850.—In *Union County, Ky.*, 1 mile below *Shawneetown, Ill.*, among trees at the top of the river bank, 15 meters from the edge of a cultivated field, and opposite a small frame house on the *Illinois* shore. (Note 61.)*
- P. B. M. 851.—In *Union County, Ky.*, 2 miles below *Shawneetown, Ill.*, about 675 meters above the *Government light* on the other shore, among trees about 12 meters back from the edge of the bank. (Note 61.)*
- P. B. M. 852.—In *Union County, Ky.*, near *Shawneetown, Ill.*, about 120 meters above the upper end of the towhead at *Shawneetown Bend*, among the willows on the first terrace above the river. (Note 61.)*
- P. B. M. 853.—Near *Cincinnati Towhead, Union County, Ky.*, at the top of the river bank at the edge of a cultivated field, about 365 meters below the foot of the towhead. (Note 61.)*
- P. B. M. 854.—Near *Cincinnati Towhead, Union County, Ky.*, about 180 meters below the *Government light* on the *Illinois* shore, on a sand bar among small willows, opposite a point about the center of the towhead. (Note 61.)*
- P. B. M. 855.—Near *Cincinnati Towhead, Union County, Ky.*, in a cultivated field, 12 meters back from the top of the river bank, and about 450 meters below a small frame house on the *Illinois* shore. (Note 61.)*
- P. B. M. 856.—Near *Dekoven, Union County, Ky.*, opposite the center of *Saline Bar*, in a cultivated field, 10 meters back from the edge of cultivation, and 600 meters below the *Government light* on the *Kentucky* shore. (Note 61.)*
- P. B. M. 857.—Near *Dekoven, Union County, Ky.*, about 600 meters above the *Government light* at the foot of *Saline Bar*, at the top of the river bank, among willow trees, and 6 meters from the edge of cultivation. (Note 61.)*
- P. B. M. 858.—Near *Dekoven, Union County, Ky.*, among the willow trees on the first terrace above the river, about 150 meters above a frame house and opposite a point about 400 meters below the mouth of the *Saline River*. (Note 61.)*
- P. B. M. 859.—Near *Dekoven, Union County, Ky.*, about $1\frac{1}{4}$ miles below the mouth of the *Saline River*, at the top of the slope of the river bank in a clump of large cottonwood trees, about 450 meters above the *Government light* on the *Illinois* shore. (Note 61.)*
- P. B. M. 860.—Near *Dekoven, Union County, Ky.*, about $\frac{1}{2}$ mile above the landing at *Dekoven*, opposite a point about 150 meters below a frame house on the *Illinois* shore, at the top of the river bank, 15 meters below the edge of the road. (Note 61.)*
- P. B. M. 860 A.—Near *Dekoven, Union County, Ky.*, about 600 meters below the coal elevator, at the top of the river bank in a cultivated field, and 12 meters from the edge of the road. (Note 61.)*
- P. B. M. 862.—1 mile below *Caseyville, Union County, Ky.*, 8 meters back from the edge of the river bank. (Note 61.)*
- P. B. M. 863.—Near *Caseyville, Union County, Ky.*, $\frac{1}{2}$ mile below the *Western Kentucky Coal Tipple* and $\frac{1}{5}$ mile above the mouth of the *Tradewater River*, at the top of the river bank, 3 meters west of an elm tree. (Note 61.)*
- P. B. M. 864.—In *Crittenden County*, near *Caseyville, Union County, Ky.*, opposite a point about 110 meters below the foot of *Tradewater Island*, on the ridge west of a pecan grove, 60 meters back from the top of the river bank, and 120 meters below a ravine. (Note 61.)*
- P. B. M. 865.—Near *Weston, Crittenden County, Ky.*, about 700 meters above the landing and 11 meters back from the top of the river bank. (Note 61.)*
- P. B. M. 866.—About 880 meters below *Weston, Crittenden County, Ky.*, about 150 meters below a ravine and 12 meters back from the top of the river bank. (Note 61.)*
- P. B. M. 867.—About $\frac{4}{5}$ mile above *Fords Ferry, Crittenden County, Ky.*, about 110 meters below a ravine, and opposite a point about 60 meters above a one-and-one-half-story frame house on the *Illinois* shore, in a cultivated field 12 meters back from the top of the river bank. (Note 61.)*
- P. B. M. 868.—At *Fords Ferry, Crittenden County, Ky.*, 550 meters below the mouth of *Crooked Creek* and opposite a point about 150 meters below a frame house on the *Illinois* shore, at the top of the river bank, on land belonging to *H. McConnell*. (Note 61.)*
- P. B. M. 869.—In *Crittenden County, Ky.*, near *Cave-in-Rock, Ill.*, opposite a point 600 meters above the vegetation on *Cave-in-Rock Island*, at the top of the river bank. (Note 61.)*
- P. B. M. 870.—In *Crittenden County, Ky.*, near *Cave-in-Rock, Ill.*, about 730 meters above the lower end of *Cave-in-Rock Island*, in a cultivated field, 30 meters back from the edge of the river bank. (Note 61.)*
- P. B. M. 871.—In *Crittenden County, Ky.*, near *Cave-in-Rock, Ill.*, on land belonging to *J. B. Easley*, 201 meters below the *Government light*, and 12 meters back from the top of the river bank. (Note 61.)*
- P. B. M. 872.—Near *Tolu, Crittenden County, Ky.*, opposite the upper end of the rock ledge on the *Illinois* shore just above *Walker Bar Towhead*, in a cultivated field, 9 meters back from the top of the river bank. (Note 61.)*
- P. B. M. 873.—Near *Tolu, Crittenden County, Ky.*, about 60 meters below the mouth of a creek on the *Illinois* shore, and opposite the center of *Walker Bar Towhead*, in a cultivated field, 18 meters back from the top of the river bank. (Note 61.)*
- P. B. M. 874.—Near *Tolu, Crittenden County, Ky.*, $\frac{3}{4}$ mile above *Big Hurricane Island*, opposite a point about 120 meters below *Walkers Bar Towhead* and 150 meters below the *Government light*, in a cultivated field, at the top of the river bank. (Note 61.)*
- P. B. M. 875.—Near *Tolu, Crittenden County, Ky.*, about 520 meters below the head of *Hurricane Island Towhead* and opposite a point about 365 meters above a slough on *Big Hurricane Island*, on the lower terrace of a willow thicket. (Note 61.)*

P. B. M. 876.—At *Tolu, Crittenden County, Ky.*, about 30 meters below Hurricane Creek, in the back yard of J. O. Brown, 9.3 meters from the northwest corner of his house, and 7.8 meters from the corner of the ell on the house. (Note 61.*)

P. B. M. 880.—In *Crittenden County, near Carrsville, Livingston County, Ky.*, opposite a point about 300 meters below Orrs Landing, in a willow thicket, about 15 meters back from the lower terrace of the river bank. (Note 61.*)

P. B. M. 881.—Near *Carrsville, Livingston County, Ky.*, about $\frac{1}{4}$ mile above the landing of the Rose Clar Lead Mine and opposite an old frame house on the hillside in Illinois, at the edge of a cultivated field at the top of the river bank. (Note 61.*)

P. B. M. 882.—Near *Carrsville, Livingston County, Ky.*, about $\frac{1}{2}$ mile above the point of Irish Jimmies Bar, and opposite the center of the Rose Clar Mine incline, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 883.—Near *Carrsville, Livingston County, Ky.*, $\frac{3}{8}$ mile above the landing, about halfway between Buck and Deer Creeks, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 884.—Near *Carrsville, Livingston County, Ky.*, about 360 meters below the mill on a sandstone rock on the hillside. The mark is a chiseled square, lettered "U. S. B. M."

P. B. M. 885.—Near *Carrsville, Livingston County, Ky.*, about $\frac{1}{3}$ mile above McElroys Landing, near the upper end of a rocky cliff and opposite a point about 90 meters below a barn on the Illinois shore, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 886.—Near *Carrsville, Livingston County, Ky.*, near the head of Grand Pierre Bar, opposite a point halfway between the Government light and a house on the Illinois shore, in a field belonging to J. T. Cox, near a barb-wire fence and underneath one of a row of cherry trees. (Note 61.*)

P. B. M. 887.—Near *Carrsville, Livingston County, Ky.*, opposite a point about $\frac{1}{2}$ mile above Grand Pierre Creek and midway between the Government light and the lower end of a cliff on the Illinois shore, at the edge of cultivation at the top of the lower terrace above the river. (Note 61.*)

P. B. M. 888.—Near *Berry Ferry, Livingston County, Ky.*, opposite Buena Vista, Ill., about $\frac{2}{3}$ mile below Grand Pierre Creek, at the top of the river bank at the edge of cultivation about 275 meters above a portable sawmill on J. N. Walter's property. (Note 61.*)

P. B. M. 889.—Near *Berry Ferry, Livingston County, Ky.*, near the head of Golconda Island, and opposite a point midway between two barns on the top of the cliff on the Illinois shore, in a willow thicket at the top of the river bank. (Note 61.*)

P. B. M. 890.—Near *Berry Ferry, Livingston County, Ky.*, behind Golconda Island, about 60 meters above a log house, and 75 meters below a barb-wire fence along a row of walnut and elm trees, on the top of the lower terrace above the river and just below a cultivated field. (Note 61.*)

P. B. M. 891.—Near *Berry Ferry, Livingston County, Ky.*, opposite the lower end of Golconda Island and about 120 meters below a creek, at the top of the river bank at the edge of cultivation. (Note 61.*)

P. B. M. 892.—Near *Berry Ferry, Livingston County, Ky.*, opposite a point about midway between the lower landing at Golconda, Ill., and a small unpainted house on the cliff, and 210 meters below the ferry landing on the Kentucky shore, at the foot of the upper terrace above the river. (Note 61.*)

High water 1883.—At *Golconda, Pope County, Ill.*, at the lower end of the warehouse at the downstream side of the wharf. The mark is on a stone tablet.

High water 1884.—At *Golconda, Pope County, Ill.*, in the same location as high water 1883.

P. B. M. 893.—Near *Berry Ferry, Livingston County, Ky.*, near the head of Pryors Island, 700 meters below Gilligans Creek and about 60 meters below a large sycamore tree, at the top of the river bank at the edge of cultivation. (Note 61.*)

P. B. M. 894.—Near *Berry Ferry, Livingston County, Ky.*, about $\frac{5}{8}$ mile below the head of Pryor's Island, about $\frac{1}{2}$ mile below a house and barn on the Illinois shore, in a cultivated field, 9 meters from the top of the river bank and about 100 meters above a house. (Note 61.*)

P. B. M. 895.—Near *Pryors Island, Livingston County, Ky.*, about $\frac{2}{3}$ mile above the lower end of the island, at the edge of cultivation at the top of the river bank, opposite a bunch of large sycamore trees. (Note 61.*)

P. B. M. 896.—Near *Bayou, Livingston County, Ky.*, opposite a point about 90 meters below Lovers Leap on the Illinois shore, at the top of the river bank at the edge of cultivation under a bunch of three cottonwood trees. (Note 61.*)

P. B. M. 897.—Near *Bayou, Livingston County, Ky.*, near the head of Sisters Island, opposite a point about 365 meters below a small white house on the bottom on the Illinois shore, 15 meters back from the river bank behind a bunch of large cottonwood trees and in a cultivated field. (Note 61.*)

P. B. M. 898.—Near *Bayou, Livingston County, Ky.*, opposite a point about midway between the lower ends of the Two Sisters Islands, at the top of the lower terrace of the river bank, in a willow thicket. (Note 61.*)

P. B. M. 899.—Near *Bayou, Livingston County, Ky.*, opposite the Government light near Bay City, Ill., opposite a point about 150 meters below Big Bay Creek, and about 275 meters above a white frame house, at the edge of cultivation at the top of the river bank. (Note 61.*)

P. B. M. 900.—Near *Bayou, Livingston County, Ky.*, about $\frac{1}{2}$ mile above Bayou Creek, and opposite the summit of the first hill below Bay City, Ill., in a cultivated field 6 meters back from the top of the river bank. (Note 61.*)

P. B. M. 901.—At *Bayou, Livingston County, Ky.*, 200 meters below the landing, 12 meters back from the top of the river bank in a cultivated field. (Note 61.*)

P. B. M. 902.—Near *Birdsville, Livingston County, Ky.*, about 60 meters above the Government light on the Kentucky shore and 26.6 meters from the northeast corner of an old stone chimney, at the top of the river bank. (Note 61.)*

P. B. M. 903.—At *Birdsville, Livingston County, Ky.*, about 120 meters above the landing, 12 meters back from the top of the river bank, and 9 meters above an old sawmill. (Note 61.)*

P. B. M. 903A.—At *Birdsville, Livingston County, Ky.*, on the stone curbing in front of the first building southwest from the post office. The mark is a cut on the stone, lettered "U. S."

P. B. M. 904.—About 1 mile below *Birdsville, Livingston County, Ky.*, opposite a point about 1030 meters below the lower end of *Stewarts Island*, in a cultivated field about 9 meters back from the edge of the river bank. (Note 61.)*

P. B. M. 905.—Near *Birdsville, Livingston County, Ky.*, about 470 meters below *Stewarts Island Towhead*, opposite a point about $\frac{1}{2}$ mile above a barn on the Illinois shore, on the lower terrace of the river bank at the edge of a cultivated field and a willow thicket. (Note 61.)*

P. B. M. 906.—Near *Smithland, Livingston County, Ky.*, about 1 mile above *Dog Island*, and about 150 meters below a ravine, in a cultivated field, 18 meters back from the top of the steep bank, and 15 meters above a double log house back of a row of thorn trees. (Note 61.)*

P. B. M. 907.—Near *Smithland, Livingston County, Ky.*, about 300 meters below a Government light on a tree, and opposite a point about the center of *Dog Island*, 8 meters back from the top of the river bank, in a cultivated field near a large pecan tree. (Note 61.)*

P. B. M. 908.—Near *Smithland, Livingston County, Ky.*, about 1 mile above the mouth of the *Cumberland River*, about 600 meters below *Dog Island Government light*, and opposite the upper end of *Cumberland Island*, in a cultivated field about 11 meters back from the top of the river bank. (Note 61.)*

P. B. M. 909.—At *Smithland, Livingston County, Ky.*, at the foot of the riprap bank, about 180 meters below the wharf, about 9 meters west of the center of *Front Street* in line with the center of the alley just above *Chas. H. Webb's law office*. (Note 61.)*

P. B. M. 909A.—At *Smithland, Livingston County, Ky.*, in front of the one-story frame building belonging to *C. B. Davis* on *Front Street*. The mark is a cross cut on a stone about 8 by 10 inches and lettered "U. S."

P. B. M. 910.—1 mile below *Smithland, Livingston County, Ky.*, about 485 meters below the first creek below the town, in a cultivated field about 9 meters back from the top of the river bank. (Note 61.)*

P. B. M. 911.—Near *Smithland, Livingston County, Ky.*, about $\frac{2}{3}$ mile below the head of the dike and about 90 meters above the lower light on *Cumberland Island*, in a cultivated field about 15 meters back from the top of the river bank. (Note 61.)*

P. B. M. 913.—Near *Smithland, Livingston County, Ky.*, near the head of *Cottonwood Bar*, about 900 meters above the Government light, at the edge of cultivation, opposite the lower end of a row of thorn trees, along the top of the river bank. (Note 61.)*

P. B. M. 914.—Near *Ledbetter, Livingston County, Ky.*, about $\frac{2}{5}$ mile above *Brick House Landing*, and 180 meters below *Caney Creek*, on the lower terrace above the river about 25 meters from the foot of the bank. (Note 61.)*

P. B. M. 915.—Near *Ledbetter, Livingston County, Ky.*, about 700 meters below a creek, on the first terrace above the river, 81 meters back from the top of the bank, about on the line between a cultivated field and a woods. (Note 61.)*

P. B. M. 916.—Near *Ledbetter, Livingston County, Ky.*, above *Ledbetter Landing*, nearly opposite the lower end of *Cottonwood Bar*, and opposite a point about 450 meters below a shed on the Illinois shore, on the lower terrace above the river, 9 meters back of a cultivated field, and near the edge of the timber at the foot of the upper bank. (Note 61.)*

P. B. M. 917.—Near *Ledbetter, Livingston County, Ky.*, about 180 meters above *Crowells Landing*, opposite a point about 550 meters above a house behind the trees, 5 meters back in a cultivated field at the top of the river bank. (Note 61.)*

P. B. M. 918.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, at the head of *Indiana Bar* and opposite a point about $\frac{1}{2}$ mile above the Government light on the Illinois shore, at the top of the first terrace above the river, about 4 meters back from the edge of the bank. (Note 61.)*

P. B. M. 919.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, near the foot of *Indiana Bar*, and opposite a point about $\frac{2}{5}$ mile above a landing on the Illinois shore, in a cultivated field at the top of the river bank, 12 meters back from the line of cultivation. (Note 61.)*

P. B. M. 920.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, 1 mile above the mouth of the *Tennessee River* and $\frac{1}{4}$ mile below the Government light on a pecan tree, opposite a point about $\frac{1}{2}$ mile below a landing among the trees, 9 meters back from the top of the river bank. (Note 61.)*

P. B. M. 921.—In *Livingston County*, near *Paducah, McCracken County, Ky.*, near the mouth of the *Tennessee River* and about $\frac{1}{4}$ mile above *Livingston Point*, among the trees about half way up the river bank. (Note 61.)*

P. B. M. 922.—Near *Paducah, McCracken County, Ky.*, at the lower edge of the timber on the upper end of *Tennessee Island*, and opposite a point about 210 meters above a house on the island, at the top of the river bank. (Note 61.)*

P. B. M. 923.—At *Paducah, McCracken County, Ky.*, near the top of the levee, 5.9 meters behind the building of *Armour & Co.*, 20.7 meters from the northeast corner and about 8 meters from the northwest corner. (Note 61.)*

P. B. M. 923A.—At *Paducah, McCracken County, Ky.* The bench mark is the 14-foot mark of the permanent tide gauge.

* See pp. 162-166.

P. B. M. 924.—At *Paducah, McCracken County, Ky.*, about 180 meters below a pole incline, and 45 meters below the third group of piling, counting from the top, on the Illinois Central Railroad incline, and about 9 meters above a brick-yard stack. (Note 61.)*

P. B. M. 925.—Near *Paducah, McCracken County, Ky.*, about 300 meters below the lower end of *Paducah Towhead* and 12 meters back from the water's edge. (Note 61.)*

P. B. M. 926.—Near *Paducah, McCracken County, Ky.*, directly opposite the landing of the Illinois Central Railroad ferry at *Brookport*, about 18 meters below a stranded barge and 12 meters back from the water's edge. (Note 61.)*

P. B. M. 927.—Near *Paducah, McCracken County, Ill.*, opposite a point about 300 meters below the second creek on the Illinois shore below *Brookport*, among the willow trees. (Note 61.)*

P. B. M. 929.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, opposite the mouth of *Massac Creek* and among the willows, 45 meters toward the river from two tall, ivy-covered trees, one a hackberry and the other an ash, 6 meters apart. The mark is 15 inches underground. (Note 61.)*

P. B. M. 930.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, near the foot of *Fort Massac Bar*, and about 450 meters below the Government light on the Illinois shore, at the top of the river bank, 16 meters above a cottonwood stump 2 feet in diameter. (Note 61.)*

P. B. M. 931.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, opposite a point about $\frac{1}{4}$ mile above *Harrison Bros. Co. lumberyard*, and about 30 meters above *Massac Creek* in *Kentucky*, among willow trees. (Note 61.)*

P. B. M. 932.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, about opposite the *Riverside Mills*, near twin cottonwood trees, and about 18 inches under the surface at the top of the river bank. (Note 61.)*

P. B. M. 933.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, opposite the lower end of the town and a small white farm house, at the top of the river bank in front of a sycamore tree. (Note 61.)*

P. B. M. 934.—In *McCracken County, Ky.*, $1\frac{1}{2}$ miles below *Metropolis, Ill.*, at the top of the river bank in a clump of large maple trees. (Note 61.)*

P. B. M. 935.—In *McCracken County, Ky.*, near *Metropolis, Ill.*, about 120 meters above *Little Run Creek*, at the top of the river bank at the edge of a cultivated field. (Note 61.)*

P. B. M. 936.—Near *Ragland, McCracken County, Ky.*, near *Walnut Creek*, at the top of the river bank, among the trees 5 meters toward the river from the edge of a cultivated field. (Note 61.)*

P. B. M. 937.—Near *Ragland, McCracken County, Ky.*, about $2\frac{1}{2}$ miles below *Joppa, Ill.*, $\frac{1}{2}$ mile above the Government light on the Illinois shore and 1 mile below *Willow Creek*, at the top of the river bank among the willow trees. (Note 61.)*

P. B. M. 938.—Near *Ragland, McCracken County, Ky.*, about $1\frac{1}{2}$ miles above *Joppa, Ill.*, at the top of the river bank about 6 meters above a fallen elm tree. (Note 61.)*

P. B. M. 939.—Near *Ragland, McCracken County, Ky.*, opposite a point about $\frac{1}{3}$ mile above the landing at *Joppa, Ill.*, among the trees at the top of a ridge. (Note 61.)*

P. B. M. 940.—Near *Ragland, McCracken County, Ky.*, opposite a point about 180 meters below the lowest railroad transfer incline at *Joppa, Ill.*, at the top of the river bank among the trees. (Note 61.)*

P. B. M. 941.—Near *Ragland, McCracken County, Ky.*, above *Hunting Creek* and opposite a point about $\frac{1}{2}$ mile above a barn on the Illinois shore with its ridgepole at right angles to the river, halfway up the slope of the river bank at the edge of a young cottonwood grove. (Note 61.)*

P. B. M. 942.—In *McCracken County*, near *Ogden, Ballard County, Ky.*, opposite a point about 300 meters below *Hillermans Landing* on the Illinois shore, at the top of the river bank at the edge of an oak grove. (Note 61.)*

P. B. M. 943.—In *McCracken County*, near *Ogden, Ballard County, Ky.*, 1 mile above the landing at the top of the river bank at the foot of a large oak tree. (Note 61.)*

P. B. M. 944.—Near *Ogden, Ballard County, Ky.*, about 135 meters above the mouth of a creek, near a county line stone between *McCracken* and *Ballard Counties*, at the top of the river bank, and near a large, lone sycamore at the edge of a sycamore grove. (Note 61.)*

P. B. M. 945.—Near *Ogden, Ballard County, Ky.*, opposite the head of *Grand Chain* about 1 mile below a creek, in a slight gully at the top of the river bank. (Note 61.)*

P. B. M. 947.—In *Ballard County, Ky.*, 1 mile above the landing at *Grand Chain, Ill.*, at the top of the river bank just back of a large sycamore tree and a dead tree lying parallel to the shore line. (Note 61.)*

P. B. M. 948.—In *Ballard County, Ky.*, opposite the landing at *Grand Chain, Ill.*, at the top of the bank at the edge of a mixed grove, and opposite two buildings and an outhouse on a farm at the top of a bluff clay bank. (Note 61.)*

P. B. M. 949.—In *Ballard County, Ky.*, 1 mile below the landing at *Grand Chain, Ill.*, about 900 meters above the wreck of the steamer *Pittsburg*, at the top of the river bank near three large maple trees. (Note 61.)*

P. B. M. 950.—In *Ballard County, Ky.*, 2 miles below *Grand Chain, Ill.*, about 700 meters below the wreck of the steamer *Pittsburg*, at the top of the river bank, 12 meters back from the edge of a young cottonwood grove. (Note 61.)*

P. B. M. 951.—In *Ballard County, Ky.*, near *Caledonia, Ill.*, $1\frac{1}{2}$ miles above the landing and about $\frac{1}{4}$ mile below a small creek, at the top of the river bank near two tall trees, one a sycamore and the other a pignut. (Note 61.)*

P. B. M. 952.—In *Ballard County, Ky.*, about $\frac{3}{5}$ mile above the landing at *Caledonia, Ill.*, at the top of the river bank in a bunch of willow and young cottonwood trees, and near a large hackberry tree. (Note 61.)*

* See pp. 162-166.

P. B. M. 953.—In *Ballard County, Ky.*, 700 meters below the landing at *Caledonia, Ill.*, at the top of the bank at the turn of the river, near two large maple trees and just back of a fallen sycamore lying parallel to the river. (Note 61.)*

P. B. M. 954.—In *Ballard County, Ky.*, near *Caledonia, Ill.*, at Mayballs Landing, on the top of the river bank at the lower end of a grove of large willows and about 180 meters below a farmhouse. (Note 61.)*

P. B. M. 955.—About 150 meters below *Humphries Creek, Ballard County, Ky.*, at the top of the river bank in a grove of young willow trees. (Note 61.)*

P. B. M. 956.—1 mile below *Humphries Creek, Ballard County, Ky.*, on the bank of the river in a young willow grove. (Note 61.)*

P. B. M. 957.—Near *Holloway, Ballard County, Ky.*, $1\frac{1}{2}$ miles above Cache Island, and 215 meters below the Government light, beside a large uprooted stump halfway up the river bank. (Note 61.)*

P. B. M. 958.—Near *Holloway, Ballard County, Ky.*, about $\frac{1}{2}$ mile above Cache Island, at the top of the river bank near the fence in front of the house on the McDonnell estate, 3.6 meters from the southwest corner and 7.4 meters from the northwest corner of the house. (Note 61.)*

P. B. M. 959.—Near *Holloway, Ballard County, Ky.*, 700 meters below the head of Cache Island, in a clump of young cottonwood trees at the top of the river bank. (Note 61.)*

P. B. M. 960.—Near *Holloway, Ballard County, Ky.*, about $\frac{1}{8}$ mile above the lower end of Cache Island, at the top of the river bank behind a clump of large cottonwood trees, and between the pike and the fence. (Note 61.)*

P. B. M. 961.—At *Holloway, Ballard County, Ky.*, opposite Mound City, Ill., at the top of the river bank in the public road, 8 meters above the store and near a large stump about 5 feet high. (Note 61.)*

P. B. M. 962.—Near *Holloway, Ballard County, Ky.*, below Mound City, Ill., about 180 meters below a house, at the top of the river bank among the trees and near a very large elm. (Note 61.)*

P. B. M. 963.—Near *Holloway, Ballard County, Ky.*, below Mound City, Ill., at the top of the river bank about 90 meters above a house, near three very large cottonwood trees, and between a maple and a cottonwood tree. (Note 61.)*

P. B. M. 964.—Near *East Cairo, Ballard County, Ky.*, about $\frac{3}{8}$ mile above the railroad bridge, at the top of the river bank, near a fence around a barn with its ridgepole parallel to the river. (Note 61.)*

P. B. M. 965.—Near *East Cairo, Ballard County, Ky.*, about 885 meters below the railroad bridge, at the top of the river bank, about halfway between a walnut tree and a locust tree. (Note 61.)*

P. B. M. 2.—At *Cairo, Ill.* (See Report for 1899, p. 599.)

P. B. M. 966.—Near *East Cairo, Ballard County, Ky.*, opposite the upper end of the landing at *Cairo, Ill.*, at the top of the river bank, and about 180 meters below the remains of an old railroad transfer slip. (Note 61.)*

P. B. M. 967.—Near *East Cairo, Ballard County, Ky.*, $\frac{1}{2}$ mile below the lower of the abandoned railroad transfer slips, at the top of the river bank, 12 meters back from the edge of a young willow grove. (Note 61.)*

P. B. M. 968.—Near *East Cairo, Ballard County, Ky.*, at the mouth of the Ohio River, about 180 meters below a point opposite the end of the Illinois shore, at the top of the river bank, about 12 meters back from the edge of a young cottonwood grove. (Note 61.)*

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN TERRE HAUTE, IND., AND SHAWNEETOWN, ILL., ESTABLISHED BY CORPS OF ENGINEERS, UNITED STATES ARMY, 1903 AND 1911.

(These descriptions are from information furnished by the Chief of Engineers and are here reproduced essentially as furnished except for changes made for the purposes of condensing and indexing according to locality.)

U. S. G. S. 513.—At *Terre Haute, Vigo County, Ind.* (See p. 288.)

U. S. G. S. 495.—At *Terre Haute, Vigo County, Ind.* (See p. 288.)

P. B. M. Traverse.—At *Terre Haute, Vigo County, Ind.*, north of the Fort Harrison pike crossing of the Chicago & Eastern Illinois Railroad, 8.1 meters east of the east rail of the track, and 13.1 meters to the northwest from a blazed elm tree. The mark is an iron post stamped "Prim. Trav. Sta. No. 22."

U. S. E. 482.—At *Terre Haute, Vigo County, Ind.* (See p. 289.)

P. B. M. Vandalia No. 2.—At *Terre Haute, Vigo County, Ind.*, on the southwest corner of the bridge seat of the west pier of the Vandalia Railroad bridge over the Wabash River. The mark is a square cut within a square and lettered "U. S. B. M."

P. B. M. 1.—At *Terre Haute, Vigo County, Ind.*, on the right bank of the Wabash River, about 120 meters north of the west end of the Wabash Avenue highway bridge and 5 meters west of the top of the high made bank, in the northeast corner of the property of Louis Heyden. (Note 60.)*

P. B. M. Wabash.—At *Terre Haute, Vigo County, Ind.*, in the east end of the concrete approach to the abutment at the north side of the Wabash Avenue highway bridge over the Wabash River, 1.8 meters from the end post, and 4 inches outside the guard wall. The mark is a cross in the center of a 2-inch chiseled square lettered "B. M."

P. B. M. Brewery.—At *Terre Haute, Vigo County, Ind.*, at the corner of First and Wilson Streets, on the north end of the lower step of the entrance to the building of the Peoples Brewing Co. The mark is a chiseled square lettered "U.S.B.M."

P. B. M. 2.—At *Terre Haute, Vigo County, Ind.*, in the front yard of the cottage at 613 Prairieton Avenue, the first house south of the Commercial Distilling Co., 1 meter from the north yard fence, 3 meters from the east fence and 2 meters west of a blazed oak tree. (Note 60.)*

* See pp. 162-166.

P. B. M. 3.—Near *Prairieton, Vigo County, Ind.*, about 7 miles below *Terre Haute*, on the farm of *Theodore Hullman*, about 100 meters east of the river bank, in the fence corner 1 meter east of the road fence, 1.5 meters south of the barn-yard fence, and about 75 meters west from the dwelling house. (Note 60.*)

P. B. M. 4.—About $1\frac{1}{4}$ miles below *Prairieton, Vigo County, Ind.*, about 1 mile back from the river, on the north side of the road leading west from *Prairieton*, and on the west side of the road turning off to the river, at the southeast corner of a cultivated field owned by *John Rotz*, about 30 meters north of a small dwelling occupied by *George McCoy*, 1 meter inside of the east fence and 1.2 meters inside of the south fence. (Note 60.*)

P. B. M. 5.—Near *Prairieton, Vigo County, Ind.*, about $\frac{1}{4}$ mile below the lower end of *Strains Ripple*, about 12 meters south of the levee running east and west along the top of the river bank, about 30 meters north of the dwelling house on the farm of *S. A. Paddock* and 100 meters east of the "White" schoolhouse, 5 meters south of the center line of the road, 1 meter south of the yard and road fence and just at the junction of the yard and garden fences. (Note 60.*)

P. B. M. 6.—In *Vigo County, Ind.*, near *Darwin, Ill.*, about 180 meters above the upper end of *Aurora Bend* and 15 meters east of the road leading to *Darwin*, in the front yard of the house of *Fred Maurer*, 3.7 meters west of the north-west corner of the house. (Note 60.*)

P. B. M. 7.—In *Vigo County, Ind.*, opposite *Darwin, Ill.*, about 8 meters east of the center of the road at the point where it turns down the steep bank to the ferry, near the center of a square formed by 4 blazed cottonwood trees, each about 10 or 11 meters distant from the mark. (Note 60.*)

P. B. M. 8.—Near *York, Clark County, Ill.*, about 100 meters west of the river at the upper end of *Chenoweths Reach*, 20 meters southeast of the southeast corner of the two-story green brick house belonging to *M. C. Chenoweth*, 5 meters west of the road, in the corner formed by the yard and poultry-yard fences. (Note 60.*)

P. B. M. 9.—Near *York, Clark County, Ill.*, 50 meters from the top of the river bank in the southeast corner of the barnyard of *G. H. Whitlock*, 30 meters east of the southeast corner of his dwelling and 18 meters west of a 24-inch blazed maple tree. (Note 60.*)

P. B. M. 10.—At *York, Clark County, Ill.*, 50 meters north of the top of the river bank on a vacant lot, the property of *Mrs. J. H. Rook*, 15 meters southwest of the intersection of the ferry road and the first street parallel to the river. (Note 60.*)

P. B. M. 11.—In *Crawford County*, near *York, Clark County, Ill.*, about $\frac{1}{4}$ mile southwest of the mouth of *Raccoon Creek*, on the property of *Oliver Meeker*, about 60 meters north of the center of a lane, in a group of trees surrounding an old cabin, 12 meters southeast of the southeast corner of the cabin and 12 meters north of the northeast corner of a small 1-room building. A blazed sycamore and a blazed split-bodied maple, each distant 3.7 meters, bear northeast and west, respectively. (Note 60.*)

P. B. M. *Hutsonville*.—At *Hutsonville, Crawford County, Ill.*, in the north end of the lowest stone step at the main entrance to the public-school building. The mark is a chiseled square lettered "U. S. B. M."

P. B. M. 12.—At *Hutsonville, Crawford County, Ill.*, in the southwest corner of the public-school grounds, about 1 meter east of the east edge of the sidewalk and $\frac{1}{10}$ meter north of the east-and-west property fence. (Note 60.*)

P. B. M. 13.—Near *Hutsonville, Crawford County, Ill.*, just south of the point where the road turns east to *Harneys Ferry*, 75 meters west of the river bank on the property of *John Colliflower*, 40 meters east of the southeast corner of his dwelling, 1 meter south of his south garden fence, $\frac{1}{10}$ meter west of the road fence and 3 meters north of a small apple tree. (Note 60.*)

P. B. M. *Plunkett*.—In *Crawford County, Ill.*, opposite *Merom, Ind.*, 15 meters north of the road leading down to the ferry on the south end of the lowest of the 8 steps leading to the porch on the residence of *J. E. Plunkett*. The mark is a cross in the center of a chiseled square lettered "U. S. B. M."

P. B. M. 14.—In *Crawford County, Ill.*, opposite *Merom, Ind.*, about 60 meters from the top of the river bank and about 30 meters west of the dwelling of *J. E. Plunkett*, in the southeast corner of the garden, 8 meters north of the road leading down to the ferry. (Note 60.*)

P. B. M. *Riverton*.—At *Riverton, Sullivan County, Ind.*, on the south end of the bridge seat surface of the concrete abutment at the east end of the *Illinois Central Railroad* bridge over the *Wabash River*, $\frac{1}{10}$ meter from the face of the retaining wall and 1 meter below the center line of the downstream chord of the bridge. The mark is the center of a chiseled square, lettered "U. S. B. M."

P. B. M. 15.—Near *Riverton, Sullivan County, Ind.*, $1\frac{1}{4}$ miles below *Greers Ripple* and about 120 meters back from the river bank, in the northwest corner of the yard and 11 meters in front of the cabin occupied by *Judd Smith* and owned by *W. H. Jones*. There is a small iron pipe about 68 meters to the northwest. (Note 60.*)

P. B. M. 16.—Near *Riverton, Sullivan County, Ind.*, about $1\frac{1}{4}$ miles above the point formerly known as *Hites Ferry*, at the inside base of the levee opposite a fisherman's shack on the other side of the levee, about 8 meters above where the east and west section line road turns up the river and about 120 meters above the upper one of two pile hurdles in the river about 90 meters apart. (Note 60.*)

P. B. M. 17.—Near *Riverton, Sullivan County, Ind.*, about $\frac{3}{4}$ mile above *Shaws Landing* and 60 meters back from the caving river bank, on the west side of the river road at the upper end of a growth of timber along the bank, in the southwest corner of the garden owned by *Ross Lynch*, 55 meters south of his house and 6 meters north of his barn. (Note 60.*)

P. B. M. 18.—In *Knox County Ind.*, near *Russellville, Ill.*, opposite Longtown landing, in the southeast corner of the apple orchard, 1 meter from the fence, and 150 meters south of the barn on the farm owned by A. Black and occupied by Exin Higgins. (Note 60.*)

P. B. M. 19.—In *Knox County, Ind.*, near *Russellville, Ill.*, about $\frac{1}{2}$ mile back from the river across from a willow bar, on the north fence line of an east and west gravel road, about 200 meters east of a high wooden bridge, the second out from the river. It is $\frac{1}{2}$ mile west of a north-and-south road at the point where a farm road turns south and runs down to a house occupied by E. E. Brown; a 24-inch blazed elm tree, distant about 3 meters, bears west. (Note 60.*)

P. B. M. 20.—At *Russellville, Lawrence County, Ill.*, about 100 meters back from the river bank, on the east side of the public road leading north to Palestine, Ill., and south to Vincennes, Ind., in the southwest corner of a lot owned by James Broyle, just across the road from the town house, and about 30 meters above where the road turns east to the ferry; about 10 meters northwest of a frame house on the corner, about 10 meters south of a 30-inch cottonwood tree, and about 10 meters north of a 40-inch maple tree. (Note 60.*)

P. B. M. 21.—About 5 miles below *Russellville, Lawrence County, Ill.*, about $\frac{1}{4}$ mile below the point formerly known as Belgrade Landing on the east side of the public road, 38 meters southwest of W. H. Wetham's house, $\frac{2}{3}$ meter inside the property line, in line with the fence separating the barnyard and lawn. (Note 60.*)

P. B. M. 22.—In *Lawrence County, Ill.*, 3 miles above *Vincennes, Ind.*, 5 meters north of the center of the main public road where it crosses the levee, 1.2 meters from the top of the levee on the inside face, 1.2 meters west of E. W. Hedden's R. F. D. mail box, and about 60 meters south of his barn. (Note 60.*)

B. & O. No. 1.—In *Lawrence County, Ill.*, near *Vincennes, Ind.*, near the center of the top stone on the upstream end of the Illinois abutment of the Baltimore & Ohio Railroad bridge over the Wabash River. The mark is a cross chiseled on the stone and marked "U. S. P. B. M."

B. & O. No. 2.—At *Vincennes, Knox County, Ind.*, on the top of the downstream end of the south abutment of the Baltimore & Ohio Railroad bridge over the Wabash River. The mark is the center of a chiseled square lettered "U. S. E. B. M."

No. 1.—At *Vincennes, Knox County, Ind.* (See Appendix 8, Report for 1899, p. 566.)

A₃.—At *Vincennes, Knox County, Ind.* (See Appendix 8, Report for 1899, p. 566.)

P. B. M. 2-1903.—Near *Vincennes, Knox County, Ind.*, about $3\frac{1}{4}$ miles below the Baltimore & Ohio Railroad bridge, in front of the house of Earl Meskemon, near the top of the river side of the levee and 6.4 meters southwest of a 48-inch blazed sycamore tree. (Note 61.*)

P. B. M. 23.—About 4 miles below *Vincennes, Knox County, Ind.*, 30 meters back from the top of the river bank and 80 meters north of the northeast corner of Homer Henderson's house, in the northwest corner of his orchard, 1 meter east of the hedge fence and 1 meter north of the wire fence. (Note 60.*)

P. B. M. 3-1903.—About 6 miles below *Vincennes, Knox County, Ind.*, and $\frac{3}{4}$ mile above the mouth of the Embarras River, near the top of the river side of the levee, at the lower end of a small field and about 250 paces above a small cabin outside the levee, and 300 paces above a barn inside the levee. (Note 61.*)

P. B. M. 24.—In *Knox County, Ind.*, near *St. Francisville, Ill.*, on the W. H. Brevoort estate, 3.7 meters from the center line of the road along near the base of the levee, 18 meters south of the two-story red house, in the northwest corner of the barn lot just inside the road fence. (Note 60.*)

P. B. M. Big Four.—In *Knox County, Ind.*, $3\frac{1}{2}$ miles above *St. Francisville, Ill.*, on the top of the lower end of the second pier on the Indiana end of the Big Four Railroad bridge over the Wabash River. The mark is the center of a 1-inch chiseled square, lettered "U. S. B. M."

P. B. M. 25.—In *Knox County, Ind.*, $1\frac{1}{2}$ miles above *St. Francisville, Ill.*, on top of a prominent narrow sand ridge, 75 meters southeast of a road at the point where it crosses the ridge and 6 meters west of a triple-bodied blazed elm tree in the swale. (Note 60.*)

P. B. M. 26.—In *Knox County, Ind.*, 3 miles below *St. Francisville, Ill.*, in the northeast corner of the yard of the two-story white frame residence of John Rainey, 11 meters northeast of the northeast corner of the house and just inside of the yard fence. (Note 60.*)

P. B. M. 27.—About $2\frac{3}{4}$ miles above *Little Rock, Knox County, Ind.*, 12 meters back from the top of the river bank in the northwest corner of the garden plot of the caretaker's house on the property of the Wabash Fishing Club, $\frac{2}{3}$ meter east of the east end of the heavy wrought-iron fence and 9 meters east of an 18-inch blazed hickory tree. (Note 60.*)

P. B. M. 10-1903.—At *Little Rock, Knox County, Ind.*, in the lane where the road leaves the river, at the west end of a corn crib, 20 paces east of the public scales and 12 meters east of the mail box of Edwin Self. (Note 61.*)

P. B. M. 28.—About $2\frac{1}{2}$ miles below *Little Rock, Knox County, Ind.*, in the northeast corner of the yard of the one-and-one-half story white dwelling of Perry Cunningham, on the southwest corner of a south and an east-and-west road, about 14 meters northeast of the northeast corner of the house, about 8 meters west of the center line of the south road at the junction, and 8 meters back from the top of the river bank, just inside the yard fence. (Note 60.*)

P. B. M. 29.—In *Knox County, Ind.*, about 4 miles above *Mount Carmel, Ill.*, about $1\frac{3}{4}$ miles above Grand Rapids locks, on land belonging to James Carson, about $\frac{1}{4}$ mile below the bridge over a main drainage ditch and 200 meters below a smaller ditch, about 5 meters west of the southwest corner of a small tenant house on a high mound, 5 meters east of the center of the road along the top of the river bank, and 2 meters northeast of a blazed walnut tree. (Note 60.*)

P. B. M. 12-1903.—In *Knox County, Ind.*, near *Mount Carmel, Ill.*, about $\frac{1}{2}$ mile below a point opposite Hanging Rock, about $1\frac{1}{2}$ miles above the Grand Rapids lock and dam and nearly opposite the lower end of a small island,

exactly on the fence line, halfway between two drainage ditches, 5 meters northeast of the center line of the road and 9 meters northeast of a 24-inch blazed black-oak tree. (Note 61.)*

P. B. M. 13-1903.—In *Knox County, Ind.*, 2 miles above *Mount Carmel, Ill.*, where the coping stones meet near the upper heelpost on the land wall of the Grand Rapids lock. (Note 61.)*

P. B. M. Grand Rapids.—In *Knox County, Ind.*, 2 miles above *Mount Carmel, Ill.*, near where three coping stones meet near the upper heelpost on the land wall of the Grand Rapids lock. The mark is the center of a 1-inch square sunk in the masonry, and lettered "U. S. P. B. M."

P. B. M. 30.—In *Gibson County, Ind.*, opposite *Mount Carmel, Ill.*, 150 meters back from the river bank and 160 meters below the Southern Railway bridge across the Wabash River, 8 meters from the upper corner of the house owned by George Coombs and occupied by C. G. Patry, and on the outside of the river road. (Note 60.)*

P. B. M. 15, 1903.—In *Gibson County, Ind.*, near *Mount Carmel, Ill.*, about $\frac{1}{2}$ mile below the foot of Patoka Island, $\frac{1}{4}$ mile above a cable ferry, and 30 paces below the front gate of Anton Beuligman's yard, close to the river side of the fence. (Note 61.)*

P. B. M. 31.—In *Gibson County, Ind.*, $4\frac{1}{4}$ miles below *Mount Carmel, Ill.*, 45 meters back from the top of the river bank, in front of the small house owned by Charles Kenton and occupied by Andrew Walden, 1 foot inside of the fence line. (Note 60.)*

P. B. M. 17, 1903.—In *Gibson County, Ind.*, opposite *Rochester, Ill.*, at the anchor of the ferry cable and on the river side of the fence. (Note 61.)*

P. B. M. 32.—About 1 mile above *Crowleyville, Gibson County, Ind.*, about 3 miles below the cable ferry at *Rochester, Ill.*, in the northwest corner of the yard of the house occupied by Jordan Garrett, 1 meter inside of each of the fences, and 10 meters from a hickory tree, with its top broken out, standing at the top of the river bank. (Note 60.)*

P. B. M. 18, 1903.—About 1 mile above *Crowleyville, Gibson County, Ind.*, about $\frac{1}{4}$ mile above the church house, 10 meters below the residence of Jordan Garrett, on the river side of the intersection of the road fence and the fence at the lower side of the garden, and about 45 meters below P. B. M. 32. (Note 61.)*

P. B. M. 33.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 1 mile below *Jimtown, Ind.*, about $\frac{1}{2}$ mile below the ruins of an old sorghum mill, 35 meters back from the top of the river bank, in the southeast corner of the garden plot in front of the white house occupied by Allan Collins, 1 meter inside of each of the fences, and 12 meters from the house. (Note 60.)*

P. B. M. 20, 1903.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 1 mile below *McCrearys Bluff*, on the river side of the road, $\frac{1}{4}$ mile above a large white house and 50 paces below a small house. (Note 61.)*

P. B. M. 34.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about $1\frac{3}{4}$ miles below *McCrearys Bluff*, at the southwest corner of the yard of the small red dwelling of Millard Hagler, 1 meter inside of the fences and 6 meters from the northwest corner of the house, about 120 meters back from the top of the river bank, and 180 meters west of a schoolhouse on the other side of the road. (Note 60.)*

P. B. M. 35.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 2 miles above *Seagars Island*, about 250 meters from the river, at the corner of the yard of a small house, 1 meter from the fences, and 6 meters from the southeast corner of the house, 30 meters west of the prominent red barn, and 30 meters south of the farm road at the top of the high bank. (Note 60.)* A small iron pipe established by the base-line party is 6 meters east of the mark.

P. B. M. 22, 1903.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about $\frac{1}{4}$ mile below the foot of *Seagars Island*, at the top of the river bank between a house and a corn crib, 62.5 meters from the house, and 26.2 meters from the crib. (Note 61.)*

P. B. M. 36.—In *Gibson County, Ind.*, about $4\frac{1}{2}$ miles above *Grayville, Ill.*, about 200 meters below a prominent gravel and sand bar, 18 meters from the top of the river bank, in the corner of the yard of an abandoned cabin, 15 meters southwest of the cabin, 30 meters above a log corn crib, and 12 meters east of a blazed 40-inch swell-butted oak. Twin sycamores and two maples near the blazed tree show prominently from the river. (Note 60.)*

P. B. M. 23, 1903.—In *Gibson County, Ind.*, near *Grayville, Ill.*, about 3 miles below *Seagars Island* and just above a clump of timber, in the northeast corner of a garden, 54 meters northeast of a house and at the top of the caving river bank. (Note 61.)*

P. B. M. 37.—In *Gibson County, Ind.*, opposite *Grayville, Ill.*, about 18 meters back from the levee in a cultivated field, at the point where the road outside the levee, and the one along the river from *Griffin, Ind.*, intersect and lead to the *Grayville ferry*. A 12-inch blazed coffee-bean tree, distant 12 meters, bears west. (Note 60.)*

P. B. M. 25, 1903.—In *Posey County, Ind.*, about $1\frac{3}{4}$ miles below *Grayville, Ill.*, on the downstream end of the west pier on the Indiana end of the Illinois Central Railroad bridge over the Wabash River. The mark is the center of a chiseled square, lettered "U. S. E. B. M."

P. B. M. 38.—In *Posey County, Ind.*, near *Grayville, Ill.*, about $3\frac{1}{2}$ miles above *New Baltimore, Ind.*, and $\frac{1}{4}$ mile back from the river, in the northwest corner of the garden plot on the land of R. Brooks, 35 meters east of the road to *New Harmony*, and 8 meters northeast of a small house. (Note 60.)* A small iron pipe established by a base-line party is 5 meters south of the mark.

P. B. M. 39.—About 4 miles above *New Harmony, Posey County, Ind.*, 1 meter inside the fences, in the northeast corner of the back yard of the small house owned and occupied by D. M. Ades, about 100 meters back from the river bank, 12 meters above the bank of the *Black River*, and 100 meters south of the highway bridge across *Black River*. (Note 60.)*

P. B. M. 28, 1903.—About 3 miles above *New Harmony, Posey County, Ind.*, about 25 meters from the south end of the large white house of Link Ford, on the north side of a fence, about 10 meters from the top of the river bank and 15 meters from the fence corner. (Note 61.)*

U. S. G. S. 392.—At *New Harmony, Posey County, Ind.*, in the north window sill of the building of the New Harmony Banking Co. (Note 17.)*

U. S. G. S. 387.—At *New Harmony, Posey County, Ind.*, at the west end of the top step of the north entrance to the Murphy Library. (Note 17.)*

P. B. M. New Harmony.—At *New Harmony, Posey County, Ind.*, at the lower edge of town, 24 meters south of the west end of Steam Mill Street, close to the wire fence on the west side of the alley, just back of the house of Le Roy Cox, and 2 meters north of Capt. Ribeyre's red barn. (Note 61.)*

P. B. M. 40.—At *New Harmony, Posey County, Ind.*, at the lower edge of town, 21 meters south of the west end of Steam Mill Street, 45 meters north of the road leading to the ferry, at the southwest corner of the yard surrounding the house of Le Roy Cox, and 6 meters east of Capt. Ribeyre's red barn. It is about 15 meters below P. B. M. New Harmony, and on the opposite side of the alley. (Note 60.)*

P. B. M. Δ 4, 1903.—Near *New Harmony, Posey County, Ind.*, about $\frac{1}{2}$ mile below the head of Turkey Island, and 50 meters back from the top of the river bank, 33 meters northeast of the house occupied by John Fisher, 4 meters west of the north corner of the barn, $\frac{1}{10}$ meter north of the fence running down to the river, 6 meters south of the fence corner, and 15 meters east of the corn crib. (Note 61.)*

P. B. M. 41.—About $4\frac{1}{4}$ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, about $\frac{1}{4}$ mile below large corn cribs on the river bank, about 120 meters back from the river, on the outside of the road leading around the island, in the southwest corner of the yard surrounding the two-story white house of William Hobbs, and about 8 meters southwest of the house. (Note 60.)*

P. B. M. Δ 10, 1903.—About $5\frac{3}{4}$ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, 120 meters from the river, about 30 meters from the house occupied by a Mr. Stewart, 5 meters south of the barn, 2.5 meters west of the pump house, and 1.2 meters from the fence. (Note 61.)*

P. B. M. 42.—About $7\frac{1}{4}$ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, about 200 meters from the river, on the outside of the road leading around the island, in the southeast corner of the garden plot of the small white dwelling of George Mitchell, 1 meter inside of the fences and 14 meters southeast of the house. (Note 60.)*

P. B. M. Δ 9, 1903.—About $7\frac{1}{2}$ miles below *New Harmony, Posey County, Ind.*, on the right bank of Ribeyres Island, 12 meters from the top of the high river bank, in a cultivated field just inside of the road, 30 meters below a vacant house, and about 180 meters below P. B. M. 42 (see above). (Note 61.)*

P. B. M. 43.—In *Posey County, Ind.*, near *Maunie, Ill.*, $\frac{1}{2}$ mile above Mink Island and just above Winklers Ferry, at the top of the river bank just inside the ferry road, 2.4 meters north of a blazed 12-inch box-elder tree, and 3.6 meters east of a blazed 24-inch sycamore. (Note 60.)*

P. B. M. 44.—In *Posey County, Ind.*, about 3 miles above *Maunie, Ill.*, about 60 meters above the foot of Twin Sister Island No. 1, 30 meters back from the top of the river bank and 2 meters west of the wire fence between 2 cultivated fields. Blazed 16-inch walnut tree, distant 6 meters, bears south; two blazed thorn trees, distant 3 and 6 meters, respectively, bear northwest. (Note 60.)*

P. B. M. Aldrich.—In *Posey County, Ind.*, about $\frac{1}{2}$ mile above *Maunie, Ill.*, about 200 meters from the river, 2.4 meters north of the northeast corner of the big red barn on a high mound on the land of John Aldrich. (Note 61.)* A small iron pipe established by a base line party is about 1 meter east of the mark.

P. B. M. 31, 1903.—In *Posey County, Ind.*, near *Maunie, Ill.*, $\frac{3}{4}$ mile above the head of Grand Chain, 12 meters from the upper corner of a large tenement house on the river side of the road, near two pecan trees, and 8 meters from the iron pump in the back yard. (Note 61.)*

P. B. M. L. & N.—In *Posey County, Ind.*, about 3 miles below *Maunie, Ill.*, on the top of the upper end of the land pier of the Louisville & Nashville Railroad bridge over the Wabash River, $\frac{1}{2}$ meter above the iron base-plate, about $\frac{1}{10}$ meter from the upper end of the top course of masonry, and 1.7 meters from the sides. The mark is the center of a chiseled square, lettered "U. S. B. M."

P. B. M. 45.—In *Posey County, Ind.*, about 3 miles below *Maunie, Ill.*, about 55 meters back of the land pier of the Louisville & Nashville Railroad bridge over the Wabash River and 5 meters below the center line of the trestle. (Note 60.)*

U. S. G. S. 375.—At *Maunie, White County, Ill.*, in the middle of the northwest face of the foundation wall of the Methodist Church, 2 feet above the ground. (Note 17.)* The mark is stamped "375-Illinois-1903."

P. B. M. 33, 1903.—In *Posey County, Ind.*, near *Maunie, Ill.*, about $1\frac{3}{4}$ miles below the Louisville & Nashville Railroad bridge, in line with the upper side of the steel tower for supporting telephone wires across the river, and 9 meters toward the river from its base. (Note 61.)*

P. B. M. 46.—In *Posey County, Ind.*, $7\frac{1}{2}$ miles below *Maunie, Ill.*, about $\frac{1}{4}$ mile above Little Chain, 30 meters back from the river bank, and 9 meters southwest of the southwest corner of the small red house occupied part of the year by Herman Jeffries. (Note 60.)*

P. B. M. 47.—In *Posey County, Ind.*, near the *Mouth of the Little Wabash River*, about 60 meters above Fretageot's ferry landing, about 120 meters below the angle where the road turns away from the river, and 75 meters back from

* See pp. 162-166.

the river, 10 meters outward from the center of the road leading to Mount Vernon, Ind., and 1 meter inside of the fence line of a wooded pasture. A blazed oak, distant 26 meters, bears west. (Note 60.*) About 120 meters below the mark is a small iron pipe established by the base-line party.

P. B. M. 48.—In *Posey County, Ind.*, about $3\frac{1}{4}$ miles above the *Mouth of the Little Wabash River*, about 75 meters from the river at the top of the high bank, in the northeast corner of the yard of the small white dwelling of R. D. Walling, 5.5 meters northeast of the northeast corner of the house, and 1 meter inside of the fences. (Note 60.*) About 60 meters below the mark is a small iron pipe established by the base-line party.

P. B. M. 49.—In *Posey County, Ind.*, about 1 mile below the *Mouth of the Little Wabash River*, on the top of the high bank about 250 meters from the river, 1 meter inside of a wire fence, and 18 meters southwest of the southwest corner of a rail corn crib on a high mound and in plain view from the river, 3 meters north of a blazed 15-inch red-oak tree and 3.5 meters south of a blazed 8-inch pig hickory. (Note 60.*) A small iron pipe established by a base-line party is about 27 meters north of the mark.

P. B. M. 50.—In *Posey County, Ind.*, about 10 miles above the *Mouth of the Wabash River* and 1 mile above Levi's slough, about 250 meters from the river, 6 meters from the center line on the south side of the section line road, in the corner of the yard, 11 meters west of the northwest corner of the house owned and occupied by Ferdinand Vollmer. A barn and two sheds across the road are plainly visible from the river. (Note 60.*)

P. B. M. 39, 1903.—In *Posey County, Ind.*, near the *Mouth of the Wabash River*, about $1\frac{1}{4}$ miles below Bone Bank and opposite the upper end of Mackeys Bar, near a small shack, about 12 meters from the river on the river side of the wagon road, between a large white locust tree and a large hackberry tree at the lower edge of a small strip of large trees. (Note 61.*)

P. B. M. 51.—In *Posey County, Ind.*, about $6\frac{1}{2}$ miles above the *Mouth of the Wabash River*, $\frac{1}{2}$ mile below Mackeys Island, on the land of the Mackey heirs, 45 meters from the top of the caving river bank, in the northwest corner of the barn lot of a small tenant house, 1 meter inside of the fences, and 12 meters south of the southwest corner of the house. A 60-inch elm, distant 12 meters, bears north, and a 40-inch cottonwood, distant 12 meters, bears northwest. (Note 60.*)

P. B. M. 52.—In *Posey County, Ind.*, about $\frac{3}{4}$ mile above the *Mouth of the Wabash River*, about 275 meters from the river in cultivated land, the property of a Mr. Crumback, at the intersection of the road leading across the neck and the one leading down the river, about $\frac{3}{4}$ mile above a prominent corn crib on a high concrete-faced mound, about $\frac{1}{5}$ mile north of a shack at the top of the river bank and $\frac{1}{4}$ mile east of a shack at a turn in the road, about 3 meters northeast of a blazed 24-inch pecan tree, and about 40 meters east of another. (Note 60.*)

P. B. M. 53.—On the right-hand side of *Wabash Island, Union County, Ky.*, opposite the mouth of the Wabash River, at an open place used as a fisherman's landing, about 40 meters from the low-water bank and 135 meters above the road leading across the island. (Note 60.*)

P. B. M. 54.—In *Union County, Ky.*, about $\frac{3}{4}$ mile below the head of *Wabash Island*, about $\frac{1}{2}$ mile below the wagon bridge across Lost Creek and 100 meters above its mouth, on high ground in the southeast corner of H. R. Slack's garden, 1 meter inside of the fences, 15 meters south of the southeast corner of the barn, and 60 meters northeast of the house. (Note 60.*)

P. B. M. 839.—Near *Wabash Island, Union County, Ky.* (See p. 274.)

P. B. M. 842.—Near *Wabash Island, Union County, Ky.* (See p. 274.)

P. B. M. Kentucky.—At *Blackburn, Union County, Ky.*, opposite *Shawneetown, Ill.*, at the southwest corner of an abandoned store building in the northeast corner of the crossroads. The mark is stamped "1906." (Note 18.*)

P. B. M. Hotel.—At *Shawneetown, Gallatin County, Ill.* (See p. 291.)

P. B. M. Station.—At *Shawneetown, Gallatin County, Ill.* (See p. 291.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN BELEN, N. MEX., AND EL PASO, TEX., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1905.

[From information furnished by the United States Geological Survey. Slight changes have been made for the purposes of indexing and of condensing under general notes.]

Descriptions of Geological Survey bench marks between Belen and Albuquerque, N. Mex., are given in connection with the descriptions of nearby Coast and Geodetic Survey bench marks on pages 241, 263, and 264.

U. S. G. S. 4795.—About 4.8 miles south of *Belen, Valencia County, N. Mex.*, 220 feet south of milepost 937, 50 feet west of the Atchison, Topeka & Santa Fe track, 8 feet north of a gate. (Note 18.*)

U. S. G. S. 4770.—About 1.5 miles north of *Sabinal (Bernardo post office), Socorro County, N. Mex.*, 300 feet north of the Valencia-Socorro County line, 50 feet west of the Atchison, Topeka & Santa Fe track, 12 feet north of a gate. (Note 18.*)

U. S. G. S. 4762.—About 0.5 mile south of *Sabinal (Bernardo post office), Socorro County, N. Mex.*, 400 feet south of mile post 943, 45 feet west of the Atchison, Topeka & Santa Fe track, 6 feet north of a gate. (Note 18.*)

U. S. G. S. 4743.—About 3.5 miles south of *Sabinal (Bernardo post office), Socorro County, N. Mex.*, 500 feet south of milepost 946, 50 feet west of the Atchison, Topeka & Santa Fe track, 7 feet south of a gate. (Note 18.*)

U. S. G. S. 4740.—About 6.5 miles south of *Sabinal (Bernardo post office), Socorro County, N. Mex.*, 300 feet south of mile post 949, 50 feet east of the road crossing, at a fence corner. (Note 18.*)

* See pp. 162-166.

U. S. G. S. 4720.—About 1.5 miles north of *Lajoya, Socorro County, N. Mex.*, 3 feet west of milepost 952, 50 feet east of the Atchison, Topeka & Santa Fe track. (Note 18.*)

U. S. G. S. 4691.—About 4.7 miles south of *Lajoya, Socorro County, N. Mex.*, 50 feet west of the Atchison, Topeka & Santa Fe track, at the fence line. (Note 18.*)

U. S. G. S. 4698.—About 4.2 miles north of *Alamillo, Socorro County, N. Mex.*, 180 feet west of bridge 886, 50 feet north of the Atchison, Topeka & Santa Fe track. (Note 18.*)

U. S. G. S. 4696.—About 3.5 miles north of *Alamillo, Socorro County, N. Mex.*, on the north end of steel bridge 889, 8 feet east of the Atchison, Topeka & Santa Fe track, at the corner of the retaining wall. (Note 18.*)

U. S. G. S. 4653.—At *Alamillo, Socorro County, N. Mex.*, 60 feet south of the Atchison, Topeka & Santa Fe milepost 965, at the northeast corner of the fence at the section house. (Note 18.*)

U. S. G. S. 4635.—About 3.7 miles south of *Alamillo, Socorro County, N. Mex.*, 50 feet east of the Atchison, Topeka & Santa Fe track, at a dike. (Note 18.*)

U. S. G. S. 4597.—About 1.5 miles north of *Socorro, Socorro County, N. Mex.*, 800 feet north of milepost 976, 50 feet west of the Atchison, Topeka & Santa Fe track. (Note 18.*)

U. S. G. S. 4593.—At *Socorro, Socorro County, N. Mex.*, in front of the Windsor Hotel, in line with the curb. (Note 18.*)

U. S. G. S. SOCR 4568.—About 2.5 miles south of *Socorro, Socorro County, N. Mex.*, 100 feet north of milepost 980, 50 feet west of the Atchison, Topeka & Santa Fe track, in a fence corner. (Note 18.*)

U. S. G. S. 4566.—About 5.5 miles south of *Socorro, Socorro County, N. Mex.*, 1,000 feet west of milepost 983, 60 feet west of the Atchison, Topeka & Santa Fe track, 125 feet east of an adobe house, 3 feet north of a gate. (Note 18.*)

U. S. G. S. 4548.—About 8.7 miles south of *Socorro, Socorro County, N. Mex.*, 1,300 feet south of milepost 986, 50 feet west of the Atchison, Topeka & Santa Fe track, 2 feet north of a gate. (Note 18.*)

U. S. G. S. 4539.—At *San Antonio, Socorro County, N. Mex.*, 150 feet west of the Atchison, Topeka & Santa Fe track, 6 feet south of the southeast corner of Solomon B. Chavez's house. (Note 18.*)

U. S. G. S. 4533.—About 2.5 miles south of *San Antonio, Socorro County, N. Mex.*, 27 feet west of the Atchison, Topeka & Santa Fe track, at the north end of the base line, 15 feet north of the signal. (Note 18.*)

U. S. G. S. 4509.—About 6 miles south of *San Antonio, Socorro County, N. Mex.*, 60 feet west of the Atchison, Topeka & Santa Fe track, 4 feet south of milepost 994. (Note 18.*)

U. S. G. S. 4498.—About 1.4 miles south of *Elmendorf, Socorro County, N. Mex.*, in the cement under the signal at the south end of the base line. (Note 18.*)

U. S. G. S. 4489.—About 5 miles north of *San Marcial, Socorro County, N. Mex.*, 300 feet south of milepost 1000, 50 feet west of the Atchison, Topeka & Santa Fe track, at a wire fence. (Note 18.*)

U. S. G. S. 4472.—About 2.2 miles north of *San Marcial, Socorro County, N. Mex.*, 1,300 feet north of milepost 1003, 50 feet west of the Atchison, Topeka & Santa Fe track, 2 feet north of a gate. (Note 18.*)

U. S. G. S. 106.—At *San Marcial, Socorro County, N. Mex.*, at the northwest corner of the railroad park, 3 feet west of the northwest gate. (Note 18.*)

U. S. G. S. 4458.—At *San Marcial, Socorro County, N. Mex.*, at the northwest corner of the railroad park, 3 feet west of the northwest gate. (Note 17.*)

U. S. G. S. 107.—About 0.75 mile south of *San Marcial, Socorro County, N. Mex.*, on the north end of the Atchison, Topeka & Santa Fe Railway bridge over the Rio Grande, 4 feet east of the rail, in the coping stone. (Note 17.*)

U. S. G. S. 110.—About 4 miles south of *San Marcial, Socorro County, N. Mex.*, east of the Atchison, Topeka & Santa Fe track, 60 feet east of a road crossing, 10 feet north of the wagon road. (Note 18.*)

U. S. G. S. 113.—At *Pope, Socorro County, N. Mex.*, 36 feet east of the main line of the Atchison, Topeka & Santa Fe Railway, in line with the telegraph poles. (Note 18.*)

U. S. G. S. 116.—About 2.5 miles south of *Pope, Socorro County, N. Mex.*, south of a telegraph pole; north of milepost 1015, 40 feet west of the Atchison, Topeka & Santa Fe track, in line with telegraph poles. (Note 18.*)

U. S. G. S. 119.—About 5.75 miles south of *Pope, Socorro County, N. Mex.*, 1 telegraph pole south of milepost 1018, 50 feet west of the Atchison, Topeka & Santa Fe track, in line with telegraph poles. (Note 18.*)

U. S. G. S. 122.—At *Lava, Socorro County, N. Mex.*, 0.25 mile north of the station, 700 feet south of milepost 1021, 50 feet east of the Atchison, Topeka & Santa Fe track, in line with telegraph poles. (Note 18.*)

U. S. G. S. 123.—About 0.5 mile south of *Lava, Socorro County, N. Mex.*, on a small flat surrounded by volcanic rock and lava, 14 rails south of milepost 1022, 8 rails north of the point of a curve, and 106 feet west of the Atchison, Topeka & Santa Fe track, under a mound of volcanic rock, flush with the ground, in cement. (Note 18.*)

U. S. G. S. 126.—About 3.5 miles south of *Lava, Socorro County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, 5 feet south of milepost 1025. (Note 18.*)

U. S. G. S. 129.—About 6.5 miles south of *Lava, Socorro County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet south of milepost 1028. (Note 18.*)

U. S. G. S. 132.—About 9.5 miles south of *Lava, Socorro County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, 6 feet south of milepost 1031. (Note 18.*)

U. S. G. S. 135.—About 2 miles south of *Crocker, Sierra County, N. Mex.*, 40 feet west of the Atchison, Topeka & Santa Fe track, south of mile post 1034. (Note 18.*)

U. S. G. S. 138.—About 5 miles south of *Crocker, Sierra County, N. Mex.*, 40 feet west of the Atchison, Topeka & Santa Fe track, 6 feet south of milepost 1037. (Note 18.*)

U. S. G. S. 141.—About 8 miles south of *Crocker, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, 5 feet south of milepost 1040. (Note 18.*)

U. S. G. S. 4727.—At *Engle, Sierra County, N. Mex.*, 150 feet north of the station, between the main line and the side track of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

U. S. G. S. 147.—About 3 miles south of *Engle, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1046. (Note 18.*)

U. S. G. S. 150.—About 6.25 miles south of *Engle, Sierra County, N. Mex.*, 0.25 mile south of milepost 1049, 700 feet south of the lake, 135 feet south of the cattle guard, 55 feet east of the track, and 5 feet south of a telegraph pole. (Note 18.*)

U. S. G. S. 150½.—4 inches west of U. S. G. S. 150 (see above). (Note 17.*)

U. S. G. S. 153.—About 0.75 mile south of *Cutter, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet south of milepost 1052. (Note 18.*)

U. S. G. S. 156.—About 3.75 miles south of *Cutter, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1055. (Note 18.*)

U. S. G. S. 159.—About 1.75 miles south of *Aleman, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet north of milepost 1058. (Note 18.*)

U. S. G. S. 162.—About 4.75 miles south of *Aleman, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet north of milepost 1061. (Note 18.*)

U. S. G. S. 165.—About 0.75 mile south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 6 feet north of milepost 1064. (Note 18.*)

U. S. G. S. 168.—About 3.75 miles south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1067. (Note 18.*)

U. S. G. S. 171.—About 6.75 miles south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet north of milepost 1070. (Note 18.*)

U. S. G. S. 174.—In *Dona Ana County*, 9.25 miles south of *Upham, Sierra County, N. Mex.*, 45 feet west of the Atchison, Topeka & Santa Fe track, and 5 feet south of milepost 1073. (Note 18.*)

U. S. G. S. 177.—About 2.25 miles south of *Grama, Dona Ana County, N. Mex.*, 175 feet south of a road crossing, 70 feet west of the Atchison, Topeka & Santa Fe track, and 25 feet west of milepost 1076. (Note 18.*)

U. S. G. S. 180.—About 0.75 mile north of *Rincon, Dona Ana County, N. Mex.*, at the north end of the Atchison, Topeka & Santa Fe bridge 1035, 5 feet east of the rail, in the concrete abutment. (Note 17.*)

U. S. G. S. 283-B.—At *Rincon, Dona Ana County, N. Mex.*, at the northwest corner of Kingman Street and Railroad Avenue, 10 feet south of L. F. Elliott's storehouse and the postoffice. (Note 18.*)

U. S. G. S. 283½-B.—At *Rincon, Dona Ana County, N. Mex.*, in the east side of the town. (Note 17.*)

U. S. G. S. 286-B.—About 3 miles southeast of *Rincon, Dona Ana County, N. Mex.*, midway between mileposts 1082 and 1083, 40 feet southwest of the Atchison, Topeka & Santa Fe track, and 5 feet west of a gate, on the fence line. (Note 18.*)

U. S. G. S. 290-B.—About 0.5 mile south of *Detroit, Dona Ana County, N. Mex.*, 45 feet southwest of the public road crossing, by a wire fence, about 300 feet south of the Atchison, Topeka & Santa Fe milepost 1086. (Note 18.*)

U. S. G. S. 293-B.—About 1.5 miles south of *Tonuco, Dona Ana County, N. Mex.*, 100 feet east of the Atchison, Topeka & Santa Fe track, at the foot of a bluff, 45 feet east of milepost 1089. (Note 18.*)

U. S. G. S. 296B.—About 4.5 miles south of *Tonuco, Dona Ana County, N. Mex.*, on the north side of the canyon, 45 feet east of the Atchison, Topeka & Santa Fe track, 100 feet east of the river, and 80 feet northeast of bridge 55. (Note 18.*)

U. S. G. S. 299.—About 0.75 mile north of *Selden, Dona Ana County, N. Mex.*, 100 feet east of the Atchison, Topeka & Santa Fe track, 45 feet east of milepost 1905, by a wire fence. (Note 18.*)

U. S. G. S. 3932.—About 1 mile south of *Selden, Dona Ana County, N. Mex.*, and about 1 mile north of old Fort Selden, in a rock which projects about 40 feet out into the river. (Note 17.*)

U. S. G. S. 303B.—About 3.75 miles south of *Selden, Dona Ana County, N. Mex.*, on the fence line midway between the old and the new grade of the Atchison, Topeka & Santa Fe Railway, about 200 feet north of the intersection of the two grades. (Note 18.*)

U. S. G. S. 306B.—At *Stewarts Ranch, Dona Ana County, N. Mex.*, 900 feet south of the house, 95 feet northeast of a public road crossing, 5 feet west of the fence corner, on the west side of the wagon road. (Note 18.*)

U. S. G. S. 309B.—About 2.5 miles south of *Stewarts Ranch, Dona Ana County, N. Mex.*, 400 feet south of milepost 1105, 40 feet west of the road crossing, 7 feet south of a gate, on the fence line. (Note 18.*)

U. S. G. S. 312B.—About 1 mile south of *Dona Ana, Dona Ana County, N. Mex.*, about 500 feet south of milepost 1108, 700 feet northeast of a two-story brick house on the north side of the lane, 45 feet east of a road crossing, and 6 feet west of the fence corner. (Note 18.*)

U. S. G. S. 315B.—About 4 miles south of *Dona Ana, Dona Ana County, N. Mex.*, 300 feet north of milepost 1111, 45 feet east of a road crossing, 6 feet north of the fence corner. (Note 18.*)

U. S. G. S. 3855.—At *Las Cruces, Dona Ana County, N. Mex.*, 180 feet south of the Atchison, Topeka & Santa Fe station, 15 feet west of the main track, 12 feet north of the water tank, in the center of the driveway. (Note 18.*)

U. S. G. S. 3855A.—At *Las Cruces, Dona Ana County, N. Mex.*, 130 feet southwest of the Dona Ana County courthouse, 30 feet east of the fence corner. (Note 18.*)

U. S. G. S. 318B.—At *Las Cruces, Dona Ana County, N. Mex.*, in the city park, 5 feet west of the southeast corner of the entrance. (Note 18.*)

U. S. G. S. 3837.—At *Mesilla Park, Dona Ana County, M. Mex.*, 450 feet south of the station, and midway between the main track and the side track, of the Atchison, Topeka & Santa Fe Railway. (Note 18.*)

U. S. G. S. 323B.—About 2.75 miles south of *Mesilla Park, Dona Ana County, N. Mex.*, 200 feet southeast of milepost 1118, 45 feet west of a road crossing, 4 feet east of the fence corner. (Note 18.*)

U. S. G. S. 3813.—About 4.75 miles south of *Mesilla Park, Dona Ana County, N. Mex.*, 40 feet east of the Atchison, Topeka & Santa Fe track, 10 feet northwest of milepost 1120. (Note 18.*)

U. S. G. S. 328B.—About 7.75 miles south of *Mesilla Park, Dona Ana County, N. Mex.*, 60 feet east of the Atchison, Topeka & Santa Fe track, 15 feet east of milepost 1123. (Note 18.*)

U. S. G. S. 3794.—At *Mesquite, Dona Ana County, N. Mex.*, 38 feet east of the Atchison, Topeka & Santa Fe track 7 feet north of milepost 1124. (Note 18.*)

U. S. G. S. 332B.—About 3 miles south of *Mesquite, Dona Ana County, N. Mex.*, 100 feet northeast of milepost 1127, 90 feet east of a road crossing, 6 feet south of a gate. (Note 18.*)

U. S. G. S. 3782.—At *Vado, Dona Ana County, N. Mex.*, 100 feet south of the Atchison, Topeka & Santa Fe station, in the southeast corner of the foundation stone under the water tank. (Note 17.*)

U. S. G. S. 336B.—At *Berino, Dona Ana County, N. Mex.*, 0.25 mile south of milepost 1131, 100 feet east of the main line of the Atchison, Topeka & Santa Fe, at the west end of the lane, 6 feet south of a fence corner. (Note 18.*)

U. S. G. S. 3760.—About 0.75 mile south of *Berino, Dona Ana County, N. Mex.*, 45 feet east of the Atchison, Topeka & Santa Fe track, 10 feet north of milepost 1132. (Note 18.*)

U. S. G. S. 340B.—About 3.25 miles south of *Berino, Dona Ana County, N. Mex.*, 100 feet west of a road crossing, 6 feet east of the fence corner. (Note 18.*)

U. S. G. S. 3780.—Near *La Tuna, El Paso County, Tex.*, 33 feet west of the main line of the Atchison, Topeka & Santa Fe Railway, about 4 feet north of the line between New Mexico and Texas. (Note 18.*)

U. S. G. S. 3774.—At *Vinton, El Paso County, Tex.*, 21 feet east of the main line of the Atchison, Topeka & Santa Fe Railway, under the Vinton signboard. (Note 18.*)

U. S. G. S. 350B.—At *Cannutillo, El Paso County, Tex.*, 80 feet east of the main track of the Atchison, Topeka & Santa Fe Railway at the southwest corner of J. J. Cumflid's house. (Note 18.*)

U. S. G. S. 354B.—About 1.5 miles south of *Montoya, El Paso County, Tex.*, 40 feet west of a road crossing, 5 feet east of a fence corner. (Note 18.*)

U. S. G. S. 357B.—About 2.8 miles south of *Whites Spur, El Paso County, Tex.*, 0.25 mile north of milepost 1150, 50 feet east of the Atchison, Topeka & Santa Fe track, and 16 feet east of a public road. (Note 18.*)

U. S. G. S. 359B.—About 5.25 miles south of *Whites Spur, El Paso County, Tex.*, 240 feet north of a public road crossing, 100 feet east of the river, 45 feet east of the Atchison, Topeka & Santa Fe track, and 12 feet east of a wagon road. (Note 18.*)

Boundary 1.—Near *El Paso, El Paso County, Tex.* The top of the masonry at the northeast corner of Monument No. 1, marking the international boundary line.

U. S. G. S. 3698.—At *El Paso, El Paso County, Tex.* (See p. 257.)

U. S. G. S. 365.—At *El Paso, El Paso County, Tex.* (See p. 257.)

U. S. G. S. 366.—At *El Paso, El Paso County, Tex.* (See p. 257.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN MITCHELL, IND., AND OAKLAND, ILL., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1906-7.

[These descriptions were furnished by the United States Geological Survey. Slight changes have been made, chiefly for the purposes of indexing and of condensing by means of general notes.]

X.—At *Mitchell, Lawrence County, Ind.* (See App. 8, Report for 1899, p. 566.)

U. S. G. S. 688.—At *Mitchell, Lawrence County, Ind.* (See p. 289.)

U. S. G. S. 590.—At *Yockey, Lawrence County, Ind.*, at the highway crossing at the station, 80 feet east of the track of the Chicago, Indianapolis & Louisville Railway, 15 feet north of the highway, in bedrock. (Note 17.*)

U. S. G. S. 508.—About 1.68 miles north of *Yockey, Lawrence County, Ind.*, on the Chicago, Indianapolis & Louisville Railway bridge over White River, on the bridge seat at the west side of the north abutment. (Note 17.*)

U. S. G. S. 700.—At *Bedford, Lawrence County, Ind.*, on the face of the city hall, at the front entrance. (Note 17.*)

U. S. G. S. 503.—About 0.29 mile west of *Dark Hollow, Lawrence County, Ind.*, on the Chicago, Indianapolis & Louisville Railway bridge over Salt Creek, on the east side of the south abutment. (Note 17.*)

U. S. G. S. 557.—At *Avoca, Lawrence County, Ind.*, near A. H. Bridwell's residence, on the stone wall in front of the yard, 2 feet south of the gate entrance. (Note 17.*)

U. S. G. S. 644.—At *Springville, Lawrence County, Ind.*, on the schoolhouse, at the northwest corner of the foundation. (Note 17.*)

U. S. G. S. 575.—About 1.58 miles west of *Springville, Lawrence County, Ind.*, about 400 feet southeast of a small stone house 15 feet east of a private road crossing, and 4 feet south of the track of the Chicago, Indianapolis & Louisville Railway, on a large rock. (Note 17.)*

U. S. G. S. 551.—At *Armstrong, Lawrence County, Ind.*, on the Chicago, Indianapolis & Louisville Railway water tank, on the front face of the stone foundation.—(Note 17.)*

U. S. G. S. 565.—In *Greene County*, 2.13 miles west of *Armstrong, Lawrence County, Ind.*, 100 feet east of the railroad bridge over Indian Creek, 10 feet north of the track of the Chicago, Indianapolis & Louisville Railway, in the top of a limestone boulder. (Note 17.)*

U. S. G. S. 641.—At *Owensburg, Greene County, Ind.*, 343 feet west of the station of the Chicago, Indianapolis & Louisville Railway, on an overhead railroad bridge, on top of the coping stone, at the south side of the track. (Note 17.)*

U. S. G. S. 543.—At *Robison, Greene County, Ind.*, on a highway bridge on the south side of the Chicago, Indianapolis & Louisville Railway track, at the top of the north wing wall of the east abutment, stamped "543." (Note 17.)*

U. S. G. S. 755.—About 2.86 miles north of *Robison, Greene County, Ind.*, on the southwest corner of the church of the Latter Day Saints, on its front face. (Note 17.)*

U. S. G. S. 880.—At *Cincinnati, Greene County, Ind.*, in the front yard of J. H. Neals, stamped "Prim. Trav. Sta. No. 7-880." (Note 18.)*

U. S. G. S. 519.—At *Koleen, Greene County, Ind.*, 378 feet north of the station, 45 feet north of the track of the Chicago, Indianapolis & Louisville Railway, and 45 feet northwest of milepost "C 26." (Note 18.)*

U. S. G. S. 509a.—At *Mineral City, Greene County, Ind.*, 0.38 mile east of the station, 125 feet west of a road crossing, 20 feet south of the track of the Chicago, Indianapolis & Louisville Railway, in the northwest corner of the lot owned by Charles Hayward. (Note 18.)*

U. S. G. S. 509.—About 2.55 miles northwest of *Mineral City, Greene County, Ind.*, 15 feet north of the track of the Chicago, Indianapolis & Louisville Railway, and 15 feet east of a private road at the foot of a hill. (Note 18.)*

U. S. G. S. 534.—At *Bloomfield, Greene County, Ind.*, 120 feet north of the Chicago, Indianapolis & Louisville Railway station, 50 feet west of wagon road, south of the southeast corner of Jones's planing mill. (Note 18.)*

U. S. G. S. 541.—At *Bloomfield, Greene County, Ind.*, in the southwest corner of the engine room of the Fawcett Manufacturing Co., on the south side. (Note 17.)*

U. S. G. S. 503.—About 1.75 miles north of *Elliston, Greene County, Ind.*, on top of the south abutment, at the west side of the county bridge, 75 feet west of the Chicago & Eastern Illinois Railroad. (Note 17.)*

U. S. G. S. 507.—About 4.73 miles north of *Elliston, Greene County, Ind.*, at a road crossing 780 feet north of milepost "T H 43," 30 feet east of the Chicago & Eastern Illinois Railroad, on the north end of a road culvert; stamped "507." (Note 17.)*

U. S. G. S. 526.—At *Worthington, Greene County, Ind.*, at the southeast corner of the Taylor Building, 338 feet south of the Chicago & Eastern Illinois station. (Note 17.)*

U. S. G. S. 521.—About 3.3 miles north of *Worthington, Greene County, Ind.*, 0.10 mile south of milepost "T H 36," 12 feet west of the Chicago & Eastern Illinois track in a boulder. (Note 17.)*

U. S. G. S. 562.—In *Owen County*, 6 miles north of *Worthington, Greene County, Ind.*, 1478 feet north of a road crossing; 1866 feet south of milepost "T H 33," and 20 feet east of the Chicago & Eastern Illinois Railroad track, on a large rock in the side of the cut. (Note 17.)*

U. S. G. S. 659.—At *Coal City, Owen County, Ind.*, on the southwest face of Red Men's Hall. (Note 17.)*

U. S. G. S. 596.—In *Clay County*, 2.4 miles northwest of *Coal City, Owen County, Ind.*, 803 feet northeast of the Chicago & Eastern Illinois Railroad, at the south corner of the cross roads near Barricks schoolhouse. (Note 17.)*

U. S. G. S. 588.—At *Clay City, Clay County, Ind.*, on the northeast corner of the Clay City roller mill, 50 feet west of the Chicago & Eastern Illinois Railroad track. (Note 17.)*

U. S. G. S. 558.—About 3.4 miles north of *Clay City, Clay County, Ind.*, on the south abutment of the Chicago & Eastern Illinois Railroad bridge over the Eel River, in the bridge seat at the west side of the track. (Note 17.)*

U. S. G. S. 569.—At *Saline City, Clay County, Ind.*, 60 feet south of the southwest corner of the Brown Hotel, at the south end of a culvert at a road crossing. (Note 17.)*

U. S. G. S. 634.—At *Cory, Clay County, Ind.*, southwest of the front face of the I. O. O. F. Building. (Note 17.)*

U. S. G. S. 608.—In *Vigo County*, 1.94 miles west of *Cory, Clay County, Ind.*, in a brick chimney at the rear of W. N. Brill's house on the Clay-Vigo county line road 300 feet south of the Chicago & Eastern Illinois Railroad. (Note 17.)*

U. S. G. S. 669.—At *Riley, Vigo County, Ind.*, in the south wall at the southeast corner of the I. O. O. F. Building. (Note 17.)*

U. S. G. S. 524.—About 4.6 miles northeast of *Riley, Vigo County, Ind.*, on top of the stone of a Chicago Terre Haute & Southeastern Railway culvert, 60 feet northeast of the highway. (Note 17.)*

U. S. G. S. 493.—About 1 mile north of *Spring Hill, Vigo County, Ind.*, on top of the bridge seat of a Chicago & Eastern Illinois Railroad culvert, 100 feet north of the crossing of the Chicago, Terre Haute & Southeastern belt line. (Note 17.)*

U. S. G. S. 495.—At *Terre Haute, Vigo County, Ind.*, on the front face of the southwest corner of the Union Station. (Note 17.)*

U. S. G. S. 513.—At *Terre Haute, Vigo County, Ind.*, on the northeast corner of the post office. (Note 17.)*

* See pp. 162-166.

U. S. E. 482.—About 0.9 mile west of *Terre Haute, Vigo County, Ind.*, on the east side of the south abutment of the Vandalia Railroad bridge over the Wabash River, on top of the bridge seat. The mark is a chiseled square.

U. S. G. S. 477.—At *West Terre Haute, Vigo County, Ind.*, on the Berry block, at the northwest corner of George L. Berry's drug store, in a stone window sill. (Note 17.*)

U. S. G. S. 508.—About 1.3 miles west of *Liggett, Vigo County, Ind.*, on top of the bridge seat of the west abutment of the Vandalia Railroad bridge. (Note 17.*)

U. S. G. S. 580.—In *Edgar County, Ill.*, 1.83 miles west of *Farrington, Clark County, Ill.*, 0.24 mile southwest of milepost "T H 10," east of the track of the Vandalia Railroad in the top of a culvert. (Note 17.*)

U. S. G. S. 644.—At *Marley, Edgar County, Ill.*, in the northeast corner of the front wall of the Methodist Episcopal Church. (Note 17.*)

U. S. G. S. 673.—About 2.1 miles northwest of *Marley, Edgar County, Ill.*, 750 feet southeast of milepost "T H 15." just west of the Vandalia Railroad track, in the top of a culvert. (Note 17.*)

U. S. G. S. 728.—About 4.3 miles northwest of *Marley, Edgar County, Ill.*, 300 feet east of the Vandalia Railroad track, and 100 feet east of a road, in the southwest corner of the front wall of the McCall schoolhouse. (Note 17.*)

U. S. G. S. 739.—At *Paris, Edgar County, Ill.*, in the wall at the east end of the Vandalia freight station. (Note 17.*)

U. S. G. S. 691.—At *May, Edgar County, Ill.*, 150 feet southeast of milepost "T H 26," just north of the Vandalia Railroad track, in the top of a culvert. (Note 17.*)

U. S. G. S. 681.—About 1.3 miles west of *May, Edgar County, Ill.*, 1050 feet west of a road crossing, in the top of the south end of the Vandalia Railroad culvert. (Note 17.*)

U. S. G. S. 691.—At *Redmon, Edgar County, Ill.*, in the front wall of the Redmon Bank. (Note 17.*)

U. S. G. S. 664.—About 0.5 mile east of *Borton, Edgar County, Ill.*, in the top of a railroad culvert north of the Vandalia Railroad track, at a road crossing. (Note 17.*)

U. S. G. S. 645.—In *Coles County, Ill.*, 2.02 miles west of *Isabel, Edgar County, Ill.*, 276 feet west of a road crossing, and 100 feet north of the Vandalia Railroad track, in the house of Ed. Gobert. (Note 17.*)

U. S. G. S. 659.—At *Oakland, Coles County, Ill.*, 250 feet west of where the Toledo, St. Louis & Western Railroad crosses the Vandalia Railroad, in the front wall of J. T. Simms's grain elevator. (Note 17.*)

C₄.—At *Oakland, Coles County, Ill.* (See Precise Leveling in the United States 1903-1907, p. 210.)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN MITCHELL, IND., AND LOUISVILLE, KY., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1911.

[These descriptions were furnished by the U. S. Geological Survey. Such changes as have been made were chiefly for the purposes of indexing and of condensing under general notes.]

X.—At *Mitchell, Lawrence County, Ind.* (See App. 8, Report for 1899, p. 566.)

U. S. G. S. 688.—At *Mitchell, Lawrence County, Ind.*, on the east face of the Bank of Mitchell, at the north corner. (Note 17.*)

U. S. G. S. 707.—At *Mitchell, Lawrence County, Ind.*, 1.1 miles south of the railroad crossing, 480 feet south of milepost 257 of the Chicago, Indianapolis & Louisville Railway, 30 feet east of the track, and 30 feet south of a road crossing. (Note 18.*)

U. S. G. S. 636.—At *Orleans, Orange County, Ind.*, 1,730 feet north of the station, 27 feet west of the track of the Chicago, Indianapolis & Louisville Railway, 30 feet north of a road, at the corner of Mr. Baker's yard fence. (Note 18.*)

U. S. G. S. 709.—Near *Leipsic, Orange County, Ind.*, about 1 mile west of the station, in the west end of concrete culvert No. 264.6, on the north side of the track of the Chicago, Indianapolis & Louisville Railway. (Note 17.*)

U. S. G. S. 735.—Near *Leipsic, Orange County, Ind.*, about $\frac{1}{2}$ mile east of the station, 30 feet north of the track of the Chicago, Indianapolis & Louisville Railway, on line with an orchard fence. (Note 18.*)

U. S. G. S. 774.—About 1.4 miles west of *Saltillo, Washington County, Ind.*, near the Orange-Washington County line, 10 feet north of the track of the Chicago, Indianapolis & Louisville Railway, in rock culvert 268.8. (Note 17.*)

U. S. G. S. 839.—About 1300 feet east of *Campbellsburg, Washington County, Ind.*, 30 feet south of the track of the Chicago, Indianapolis & Louisville Railway, beside a fence. (Note 18.*)

U. S. G. S. 886.—About 1.7 miles west of *Hitchcock (Oxonia post office), Washington County, Ind.*, on the north side of the track of the Chicago, Indianapolis & Louisville Railway, 5 feet back from the end of stone culvert 275.4, and 10 feet below the track. (Note 17.*)

U. S. G. S. 880.—About 550 feet west of *Hitchcock (Oxonia post office), Washington County, Ind.*, 30 feet south of the track of the Chicago, Indianapolis & Louisville Railway, on line with an orchard fence. (Note 18.*)

U. S. G. S. 721.—About 2.1 miles west of *Salem, Washington County, Ind.*, 15 feet north of the track of the Chicago, Indianapolis & Louisville Railway, on the west end of a stone culvert. (Note 17.*)

U. S. G. S. 728.—At *Salem, Washington County, Ind.*, 480 feet west of the station, on the south side of the track of the Chicago, Indianapolis & Louisville Railway, 6 feet from east end and 6 inches from south face of stone arch bridge No. 282.2. (Note 17.*)

U. S. G. S. 728a.—About 0.8 mile southeast of *Salem, Washington County, Ind.*, 130 feet east of a switch stand, 25 feet south of the track of the Chicago, Indianapolis & Louisville Railway. (Note 18.*)

* See pp. 162-166.

U. S. G. S. 760.—About 2.6 miles east of *Salem, Washington County, Ind.*, 6 feet south of the track of the Chicago, Indianapolis & Louisville Railway, in the west abutment of bridge No. 284.9, 260 feet west of milepost 285. (Note 17.*)

U. S. G. S. 835.—About 4300 feet south of *Norris (Harristown post office), Washington County, Ind.*, 16 feet west of the track of the Chicago, Indianapolis & Louisville Railway, in the top of the south wall of stone culvert No. 287.7. (Note 17.*)

U. S. G. S. 814.—About 4100 feet south of *Farabee, Washington County, Ind.*, 150 feet north of milepost 291, and 28 feet eastward from the track of the Chicago, Indianapolis & Louisville Railway. (Note 18.*)

U. S. G. S. 704.—About 1100 feet south of *Pekin, Washington County, Ind.*, 26 feet west of the track of the Chicago, Indianapolis & Louisville Railway. (Note 18.*)

U. S. G. S. 577.—About 0.6 mile northwest of *Borden, Clark County, Ind.*, 6 feet southwest of the track of the Chicago, Indianapolis & Louisville Railway, in the northwest stone abutment of bridge No. 298.4. (Note 17.*)

U. S. G. S. 520.—About 3 miles southeast of *Borden, Clark County, Ind.*, 120 feet northwest of milepost 302, and 10 feet northeast of the track of the Chicago, Indianapolis & Louisville Railway, in the southeast side of stone culvert No. 301.9. (Note 17.*)

U. S. G. S. 504.—About 400 feet northeast of *Bridgeport, Clark County, Ind.*, 9 feet southwest of the track of the Chicago, Indianapolis & Louisville Railway, in the southwest abutment of steel bridge No. 303.7. (Note 17.*)

U. S. G. S. 545.—About 0.9 mile south of *Wilson, Clark County, Ind.*, 9 feet west of the track of the Chicago, Indianapolis & Louisville Railway, in the top of rock culvert No. 306.5. (Note 17.*)

U. S. G. S. 547.—About 800 feet south of *St. Joseph, Clark County, Ind.*, 10 feet east of the track of the Chicago, Indianapolis & Louisville Railway, in the top of stone arch culvert No. 309.6. (Note 17.*)

U. S. G. S. 536.—About 4.8 miles north of *New Albany, Floyd County, Ind.*, 11 feet west of the track of the Chicago, Indianapolis & Louisville Railway, in stone culvert No. 312.8. (Note 17.*)

U. S. G. S. 456.—At *New Albany, Floyd County, Ind.*, 1 mile north of the Chicago, Indianapolis & Louisville Railway station, 12 feet south of the track, in the north side of the wye, in the east stone abutment of a steel bridge. (Note 17.*)

464 Ind.—At *New Albany, Floyd County, Ind.*, 125 feet south of the Chicago, Indianapolis & Louisville Railway station, at the southeast corner of Main and Vincennes Streets. (Note 18.*)

R. R. Bridge.—At *Louisville, Jefferson County, Ky.*, in the west concrete abutment of the Twenty-seventh Street railroad bridge, on the north side of the track. The mark is the center of a chiseled square.

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN DUQUOIN AND SHAWNEETOWN, ILL., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1906.

[These descriptions were furnished by the U. S. Geological Survey. Slight changes have been made, chiefly for the purposes of indexing and of condensing under general notes.]

R₃.—At *Duquoin, Perry County, Ill.* (See App. 8, Report for 1899, p. 600.)

U. S. G. S. 468.—At *Duquoin, Perry County, Ill.*, 600 feet east of the Illinois Central Railroad station, in the east brick wall of the Exchange Bank. (Note 17.*)

U. S. G. S. 396.—About 3.2 miles east of *Duquoin, Perry County, Ill.*, 60 feet west of a creek, 40 feet north of the Illinois Central Railroad, just south of a fence corner. (Note 18.*)

U. S. G. S. 402.—1 mile southeast of *McDonald, Perry County, Ill.*, 60 feet directly north of the Illinois Central Railroad milepost "East St. Louis 77—Eldorado 44." (Note 18.*)

U. S. G. S. 449.—At *Mulkeytown, Franklin County, Ill.*, 324 feet south of the Illinois Central Railroad station, in the east side of the corner stone of the hall of the Modern Woodmen of America. (Note 17.*)

U. S. G. S. 443.—At *Christopher, Franklin County, Ill.*, in the southwest corner of the Christopher National Bank. (Note 17.*)

U. S. G. S. 392.—About 2.8 miles east of *Christopher, Franklin County, Ill.*, 348 feet west of a small bridge of the Illinois Central Railroad, 150 feet southeast of a house occupied by Isaac Denton. (Note 18.*)

U. S. G. S. 438.—About 5.7 miles east of *Christopher, Franklin County, Ill.*, 150 feet southeast of a road crossing on the Illinois Central Railroad, at the northwest corner of the house occupied by W. M. Wolf. (Note 18.*)

U. S. G. S. 474.—At *Benton, Franklin County, Ill.*, 1,507 feet north of the Illinois Central Railroad station, in the stone step just south of the west entrance to the Franklin County courthouse. (Note 17.*)

U. S. G. S. 405.—About 2.3 miles southeast of *Benton, Franklin County, Ill.*, 90 feet directly north of the Illinois Central milepost marked "E. St. Louis 92—Eldorado 29." (Note 18.*)

U. S. G. S. 479.—At *Smothers, Franklin County, Ill.*, 260 feet southeast of where a road crosses the Illinois Central Railroad, at the northwest corner of a store kept by M. M. Moore. (Note 18.*)

U. S. G. S. 438.—At *Farrish, Franklin County, Ill.*, 200 feet northeast of where a road crosses the Illinois Central Railroad, at the southwest corner of a store kept by Moore & Brown. (Note 18.*)

U. S. G. S. 494.—At *Thompsonville, Franklin County, Ill.*, 600 feet south of where a road crosses the Illinois Central Railroad, 100 feet east of a brick schoolhouse. The bench mark is stamped "Prim. Trav. Sta. No. 4—494—1906." (Note 18.*)

U. S. G. S. 429.—At *West End, Saline County, Ill.*, 75 feet north of the Illinois Central Railroad station, in the south wall of the West End Rolling Mill. (Note 17.*)

U. S. G. S. 392.—About 0.7 mile southeast of *Rileyville, Saline County, Ill.*, 20 feet northwest of a cattle guard, in the corner of fence at the point where the county road turns north from the Illinois Central Railroad. (Note 18.*)

U. S. G. S. 397.—At *Galatia, Saline County, Ill.*, 0.3 mile west of the Illinois Central Railroad station at the Galatia Rolling Mill, in the southwest foundation of an old elevator. (Note 17.*)

U. S. G. S. Milepost.—About 3.2 miles southeast of *Galatia, Saline County, Ill.*, inside the fence, 20 feet directly south of the Illinois Central Railroad milepost marked "E. St. Louis 114—Eldorado 7." (Note 18.*)

U. S. G. S. 390.—About 1.6 miles east of *Raleigh, Saline County, Ill.*, 70 feet west of the Illinois Central Railroad milepost marked "E. St. Louis 117—Eldorado 4," 62 feet south of the center of the track. (Note 18.*)

U. S. G. S. 388.—At *Eldorado, Saline County, Ill.*, 30 feet south of the southwest corner of the Grand Hotel, at the edge of the pavement. (Note 18.*)

U. S. G. S. Grayson.—About 0.5 mile southeast of *Grayson, Saline County, Ill.*, inside the wire fence, 40 feet north of the center of the Louisville & Nashville Railroad track. (Note 18.*)

U. S. G. S. Crossroads.—About 3.1 miles southeast of *Grayson, Saline County, Ill.*, 40 feet northwest of a road crossing on the Louisville & Nashville Railroad, on the west side of the road. (Note 18.*)

U. S. G. S. Station.—At *Equality, Gallatin County, Ill.*, at the northwest corner of the Louisville & Nashville Railroad station. (Note 18.*)

U. S. G. S. Fowler.—About 2.7 miles southeast of *Equality, Gallatin County, Ill.*, 100 feet southeast of E. P. Fowler's residence, in a fence corner, 40 feet north of the Louisville & Nashville Railroad track. (Note 18.*)

U. S. G. S. Six Mile.—About 5.7 miles southeast of *Equality, Gallatin County, Ill.*, 60 feet north of the Louisville & Nashville Railroad milepost marked "St. Louis 138—Shawneetown 6." (Note 18.*)

U. S. G. S. Five Mile.—About 2.5 miles east of *Cypress Junction, Gallatin County, Ill.*, 330 feet west of where a road crosses the Louisville & Nashville Railroad, and 50 feet north of milepost marked "St. Louis 141—Shawneetown 5," (Note 18.*)

P. B. M. Station.—At *Shawneetown, Gallatin County, Ill.*, at the southwest corner of the Louisville & Nashville Railroad station. (Note 18.*)

P. B. M. Hotel.—At *Shawneetown, Gallatin County, Ill.*, 100 feet east of the southeast corner of the Riverside Hotel, in the northeast corner of the concrete gun rack. (Note 17.*)

DESCRIPTIONS OF PERMANENT BENCH MARKS BETWEEN GEORGETOWN AND LOUISVILLE, KY., ESTABLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1906.

[These descriptions were furnished by the U. S. Geological Survey. Slight changes have been made for the purposes of indexing and condensing under general notes.]

W.—At *Georgetown, Scott County, Ky.* (See App. 3, Report for 1913, p. 624.)

U. S. G. S. 866.—At *Georgetown, Scott County, Ky.*, at the southeast corner of Sinclair's store in Mrs. T. B. Sinclair's lot. The bench mark is an iron post stamped "866" and is primary station No. 17 of the United States Geological Survey.

U. S. G. S. 798.—About 3 miles west of *Georgetown, Scott County, Ky.*, on top of the east end of a culvert abutment, north of the track of the Frankfort & Cincinnati Railway. (Note 17.*)

U. S. G. S. 840.—At *Duwall, Scott County, Ky.*, near the Frankfort & Cincinnati Railway station, on top of the west wall of a culvert east of the road, 5 feet north of the track. (Note 17.*)

U. S. G. S. 802.—At *Stamping Ground, Scott County, Ky.*, in Dr. Reilly's front yard, south of the Frankfort & Cincinnati Railway track, 230 feet west of the railway station. (Note 18.*) This bench mark is primary traverse station No. 26 of the United States Geological Survey.

U. S. G. S. 714.—About 2.1 miles west of *Stamping Ground, Scott County, Ky.*, on top of the west abutment of a bridge, south of the Frankfort & Cincinnati Railway track. (Note 17.*)

U. S. G. S. 732.—At *Switzer, Franklin County, Ky.*, 40 feet west of the Frankfort & Cincinnati Railway station, on top of a culvert 9 feet south of the track; stamped "732." (Note 17.*)

U. S. B. M. 744.—About 0.5 mile west of *Switzer, Franklin County, Ky.*, at the west end of the second long trestle, north of the Frankfort & Cincinnati Railway track. The bench mark is the top of a bolt in the bent, marked "U. S. B. M. 744."

U. S. G. S. 673.—At *Elkhorn station (Forks of Elkhorn post office), Franklin County, Ky.*, 75 feet west of the Frankfort & Cincinnati Railway station, at the northeast corner of a warehouse. (Note 18.*)

U. S. G. S. 714.—At *Stedmantown, Franklin County, Ky.*, 360 feet west of the Frankfort & Cincinnati Railway station, on top of the east end of a culvert, 6 feet north of the track. (Note 17.*)

U. S. B. M. 675.—About 1.9 miles west of *Stedmantown, Franklin County, Ky.*, on top of a small abutment at the west end of a steel trestle, north of the track of the Frankfort & Cincinnati Railway. It is marked with a square and the letters "U. S. B. M. 675."

U. S. G. S. 511.—At *Frankfort, Franklin County, Ky.*, at the southwest corner of the Capitol grounds. (Note 18.*)

U. S. G. S. 512.—At *Frankfort, Franklin County, Ky.*, on the post office, at the northeast corner of the front face. (Note 17.*)

U. S. G. S. 537.—About 1.3 miles west of *Kennebec, Franklin County, Ky.*, on top of the retaining wall of a steel bridge, north of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. B. M. 562.—About 2.3 miles west of *Kennebec, Franklin County, Ky.*, on top of a culvert south of the Louisville & Nashville Railroad track. It is marked with a square and the letters "U. S. B. M. 562."

Bridge.—About 0.3 mile west of *Benson, Franklin County, Ky.*, on the abutment of a Louisville & Nashville Railroad bridge. It is marked with a chiseled square.

U. S. G. S. 600.—About 0.3 mile west of *Benson, Franklin County, Ky.*, on top of the retaining wall of the east abutment of a steel bridge, north of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 714.—At *Hatton, Shelby County, Ky.*, in the front yard of C. W. Stockton's tenement house, opposite Roberts & Wright's general store, north of the Louisville & Nashville Railroad track, and 10 feet north of the fence. (Note 18.*)

U. S. G. S. 829.—About 2.8 miles west of *Hatton, Shelby County, Ky.*, on the east end of a culvert north of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 881.—About 3.7 miles west of *Hatton, Shelby County, Ky.*, on top of a rock cut, north of the Louisville & Nashville Railroad track. It is marked with a pointed square.

U. S. G. S. 912.—At *Bagdad, Shelby County, Ky.*, 40 feet west of the Louisville & Nashville Railroad station, 45 feet south of the track. (Note 18.*)

U. S. G. S. 903.—At *Christiansburg, Shelby County, Ky.*, 135 feet east of the Louisville & Nashville Railroad station, in the northeast corner of Mrs. Miriam Hall's front yard. (Note 18.*)

U. S. B. M. 882.—About 1 mile west of *Christiansburg, Shelby County, Ky.*, on top of a rock, south of the Louisville & Nashville Railroad track. It is marked with a square and the letters "U. S. B. M. 882."

U. S. G. S. 849.—About 2.2 miles west of *Christiansburg, Shelby County, Ky.*, east of the road and 43 feet south of the Louisville & Nashville Railroad track at "Mulberry Crossing." (Note 18.*)

U. S. G. S. 724.—About 6.4 miles west of *Christiansburg, Shelby County, Ky.*, on top of the west end of a culvert south of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 760.—At *Shelbyville, Shelby County, Ky.*, in the courthouse yard, 10 feet east of the southeast corner. It is primary traverse station No. 2, 1905, of the United States Geological Survey. (Note 18.*)

U. S. G. S. 750.—At *Scotts (Scotts Station post office), Shelby County, Ky.*, opposite the Louisville & Nashville Railroad station, and 45 feet north of the track at the fence line. (Note 18.*)

U. S. G. S. 725.—About 0.2 mile west of *Field Station, Shelby County, Ky.*, on top of the west abutment of a Louisville & Nashville Railroad trestle. (Note 17.*)

U. S. G. S. 825.—At *Simpsonville, Shelby County, Ky.*, in the southeast corner of the Masonic lodge grounds. The bench mark is an iron post stamped "825," and is primary traverse station No. 1, 1905, of the United States Geological Survey.

U. S. G. S. 701.—At *Connor, Shelby County, Ky.*, 50 feet south of the Louisville & Nashville Railroad station, east of a road, in the angle with the right of way. (Note 18.*)

U. S. G. S. 629.—At *Long Run, Jefferson County, Ky.*, 100 feet east of the Louisville & Nashville Railroad station, north of the track at the intersection of a road with the right of way. (Note 18.*)

U. S. G. S. 640.—About 0.2 mile west of *Eastwood, Jefferson County, Ky.*, on the west end of a culvert north of the Louisville & Nashville Railroad track. It is marked with a square.

U. S. G. S. 595.—About 0.1 mile east of *Beckley, Jefferson County, Ky.*, on top of the retaining wall of the west abutment of a bridge, south of the Louisville & Nashville Railroad track. (Note 17.*)

U. S. G. S. 634.—About 1.1 miles west of *Beckley, Jefferson County, Ky.*, on top of a culvert, north of the Louisville & Nashville Railroad track. It is marked with a square.

U. S. G. S. 652.—About 0.2 mile west of *Avoca, Jefferson County, Ky.*, on top of the east end of a culvert, south of the Louisville & Nashville Railroad track. It is marked with a square.

U. S. G. S. 724.—At *Anchorage, Jefferson County, Ky.*, in the circular park, 300 feet northwest of the clubhouse. The bench mark is an iron post and is primary traverse station No. 38 of the United States Geological Survey.

U. S. G. S. 561.—At *Lyndon, Jefferson County, Ky.*, 260 feet west of the Louisville & Nashville Railroad station, south of the track, 40 feet east of a road. It is an iron post stamped "561."

U. S. G. S. 539.—About 0.3 mile west of *Warwick Villa, Jefferson County, Ky.*, south of the Louisville & Nashville Railroad track, on the west wall of a culvert. It is marked with a square.

U. S. G. S. 550.—About 440 feet west of *St. Matthews, Jefferson County, Ky.*, 25 feet east of the forks of the road to the south. (Note 18.*) The bench mark is primary traverse station No. 118 of the United States Geological Survey.

U. S. G. S. 548.—About 0.7 mile west of *St. Matthews, Jefferson County, Ky.*, at the southwest corner of the intersection of the Finley and Shelby Pikes. (Note 18.*) The bench mark is primary traverse station No. 117 of the United States Geological Survey.

U. S. G. S. 553.—About 1.4 miles west of *St. Matthews, Jefferson County, Ky.*, at the northwest corner of Clearwater Reservoir. (Note 18.*) This bench mark is primary traverse station No. 50 of the United States Geological Survey.

No. 49.—At *Louisville, Jefferson County, Ky.*, at the southeast corner of Park Avenue and Shelbyville Road. (Note 18.*) This bench mark is primary traverse station No. 49 of the United States Geological Survey.

B. M. 86, or No. 16.—At *Louisville, Jefferson County, Ky.*, on the northeast corner of Main and Eleventh Streets, 50.1 feet from the southeast corner of Doyle's saloon, and 101.6 feet from the northeast corner of J. V. Reed & Co.'s store. The bench mark is a bronze tablet set in stone and is primary traverse station No. 16 of the United States Geological Survey.

B. M. 13.—At *Louisville, Jefferson County, Ky.*, at the southeast corner of Twenty-sixth and Portland Streets, 46.6 feet from a grocery store, and 7.9 feet from Struby's pump. The bench mark is a bronze tablet set in stone and is primary traverse station No. 13 of the United States Geological Survey.

ADDITIONS AND CORRECTIONS TO PREVIOUSLY PUBLISHED DESCRIPTIONS OF BENCH MARKS.

DESCRIPTIONS OF MISCELLANEOUS ADDITIONAL BENCH MARKS.

111A.—At *Goldsboro, Wayne County, N. C.*, on the southwest corner of the Goldsboro City Hall, on the granite water table 4 feet above the ground. (Note 1.*)

CORRECTIONS TO DESCRIPTIONS OF BENCH MARKS PUBLISHED IN APPENDIX 8, REPORT FOR 1899.

Pages 472 and 555. It was reported on September 21, 1904, that "Tidal," at *Locust Grove, Bath Beach, Long Island, N. Y.*, was lost.

Pages 472 and 556. It was reported on December 16, 1903, by Mr. John H. Frazee, that No. 6, at *Astoria, Long Island, N. Y.*, had probably been destroyed by repairs.

Pages 557 and 558. It was reported in November, 1900, by Mr. Edmund P. Ramsey that the following bench marks could not be found: No. 10 at *Flushing, N. Y.*, and No. 12 at *College Point, N. Y.*

Page 562. Mr. O. E. Carr, levelman for the Baltimore and Ohio R. R., reported in 1904 that the following bench marks were not found: J, at *Keyser, W. Va.*; XX, at *Bloomington, Md.*; XXI, near *Oakland, Md.*; and XXVIII, at *Rowlesburg, W. Va.*

Page 610. It was reported that bench mark No. 215 at *Delta, La.*, was destroyed.

Page 632. Leveling in 1905 by Mr. C. P. Burgwyn indicates that City B. M., at *Richmond, Va.*, has probably been disturbed in elevation since 1892, when the leveling was done which gave the published elevation.

Page 654. Mr. C. H. Judson, assistant engineer, New York Central Lines, stated in a letter dated August 11, 1908, that B. M. U., at *Alexis, Ohio*, was about to be destroyed by improvements, and that the resident engineer had established a new B. M. which is 2.77 feet higher than the B. M. U., and is described as follows: On the top of a concrete box culvert under the Ann Arbor R. R., just W. of the crossing of the Ann Arbor R. R. over the Lake Shore and Michigan Southern Ry.; the top of the SW. corner, marked with a chiseled B. M.

Page 655. A letter from Mr. H. A. Twining, at *Haskins, Ohio*, on April 26, 1906, stated that B. M. A₁, at *Hull Prairie, Ohio*, was about to be destroyed by repairs.

Page 670. For a later description of P. B. M. 45, at *Shreveport, La.*, see page 134 of *Precise Leveling in the United States, 1903-1907*.

Page 673. It was reported that P. B. M. 79, at *Egg Bend Landing, La.*, was destroyed.

Page 676. It was reported that the pipe was missing from P. B. M. 12 on *Bayou Macon, La.*

Page 677. Bench mark No. 7 (Melvin 1879), at *Natchez, Miss.*, is in the northeast corner of lower step of west entrance to courthouse instead of the northwest corner.

Page 690. It was reported that P. B. M. Mound at *Mound Landing, La.*, was disturbed.

The bench marks in the following list should be referred to note 8, page 550, Report for 1899, which is the same as note 39, page 164, of this publication.

P. B. M. 76 at *Grand Bend, La.*

P. B. M. 89 at *Simmesport, La.*

M. R. C. Stone $\frac{132}{3}$ at *Vidalia, La.*

M. R. C. Stone $\frac{132}{4}$ at *Vidalia, La.*

P. B. M. 1 at *Natchez, Miss.*

The bench marks in the following list should be referred to note 40, page 164 of this publication instead of to note 8, page 550, Report for 1899.

P. R. P. Frenchport II, at *Frenchport, Ark.*

P. R. P. Frenchport I, at *Frenchport, Ark.*

P. B. M. Elliot, at *Elliot, Ark.*

P. R. P. Camden I, at *Camden, Ark.*

P. B. M. Lester, at *Lester, Ark.*

P. B. M. Chidester, at *Chidester, Ark.*

P. B. M. Whelen, at *Whelen, Ark.*

P. B. M. Gurdon II, at *Gurdon, Ark.*

P. B. M. Gurdon I, at *Gurdon, Ark.*

P. B. M. Smithton, at *Smithton, Ark.*

P. B. M. Curtis, at *Curtis, Ark.*

P. B. M. Gum Springs, at *Gum Springs, Ark.*

P. B. M. Arkadelphia II, at *Arkadelphia, Ark.*

P. B. M. Wilmot, at *Wilmot, Ark.*

P. B. M. Noble, on *Bayou Bartholomew, Ark.*

P. B. M. Parkdale, at *Parkdale, Ark.*

P. B. M. Sunshine, at *Sunshine, Ark.*

P. B. M. Portland, at *Portland, Ark.*

P. B. M. Kidd, at *Kidds Spur, Ark.*

P. B. M. Morrell, at *Morrell, Ark.*

P. B. M. Hudspeth, at *Hudspeth, Ark.*

P. B. M. Dermott, at *Dermott, Ark.*

P. B. M. Baxter, at *Baxter, Ark.*

P. B. M. McGehee, at *McGehee, Ark.*

P. B. M. Trippe, at Trippe Junction, Ark.	P. B. M. Burke, at Burke, La.
P. R. P. Gibson, at Gibsons Landing, La.	P. B. M. Archibald, at Archibald, La.
P. B. M. 5a, at Jones Bayou, La.	P. B. M. Mangham, at Mangham, La.
P. B. M. 6a, at McClures Landing, La.	P. B. M. Big Creek, at Big Creek, La.
P. B. M. 7a, at Eva, La.	P. B. M. Baskin, at Baskin, La.
P. B. M. 8a, at Hardscramble Landing, La.	P. B. M. Steele, at Steeles Switch, La.
P. B. M. 9a, at Lums, La.	P. B. M. Winnsboro, at Winnsboro, La.
P. B. M. 10a, at New Era, La.	P. B. M. Eden, at Eden, La.
P. B. M. 11a, at Acme, La.	P. B. M. Gilbert, at Gilbert, La.
P. B. M. 12a, at Mouth of Black River, La.	P. B. M. Wisner, at Wisner, La.
P. B. M. Sandidge, on Bayou Bartholomew, La.	P. B. M. Elam, at Elam, La.
P. B. M. Myers, on Bayou Bartholomew, La.	P. B. M. Peck, at Peck, La.
P. B. M. Williams, on Bayou Bartholomew, La.	P. B. M. Newman, near Peck, La.
P. B. M. Anderson, on Bayou Bartholomew, La.	P. B. M. Chisum, near Florence, La.
P. B. M. Bonner, on Bayou Bartholomew, La.	P. B. M. Florence, at Florence, La.
P. B. M. Davis 2, on Bayou Bartholomew, La.	P. B. M. Copeland, at Copeland, La.
P. B. M. Ward, on Bayou Bartholomew, La.	P. B. M. Kirk, at Kirks Ferry, La.
P. B. M. Wells, on Bayou Bartholomew, La.	P. B. M. Tensas, at Greenville, La.
P. B. M. Mound, at Mound Landing, La.	P. B. M. Lee Bayou, at Lee Bayou, La.
P. B. M. Lindgrove, at Lindgrove Landing, La.	P. B. M. Clayton, at Clayton, La.
P. B. M. Bonita, at Bonita, La.	P. B. M. Cypress, at Cypress City, La.
P. B. M. Jones, at Jones, La.	P. B. M. Helena, at Helena, La.
P. B. M. La.-Ark., near Jones, La.	P. B. M. Concordia, at Concordia, La.
P. B. M. Port Union, at Port Union Landing, La.	D, at Vicksburg, Miss.
P. B. M. Hay, near Port Union Landing, La.	E, near Vicksburg, Miss.
P. B. M. White, near Farmerville, La.	F, near Vicksburg, Miss.
P. B. M. Rodgers, near Farmerville, La.	P. B. M. Friar Point III, at Friar Point, Miss.
P. B. M. Farmerville, at Farmerville, La.	P. B. M. Coahoma, at Coahoma, Miss.
P. B. M. Scott, at Scotts Bluff, La.	P. B. M. Clover Hill, near Clover Hill, Miss.
P. B. M. Stein, at Steins Bluff, La.	P. B. M. Lyon, at Lyon, Miss.
P. B. M. Cox Ferry, near Bayou D'Arbonne La.	P. B. M. Clarksdale I, at Clarksdale, Miss.
P. B. M. 16, at Rayville, La.	P. B. M. Clarksdale II, at Clarksdale, Miss.

CORRECTIONS TO DESCRIPTIONS OF BENCH MARKS PUBLISHED IN APPENDIX 3, REPORT FOR 1903.

Page 622. In line 2, P. B. M. XLIX should be changed to P. B. M. Fort Adams.

Page 627. Mr. G. B. Nicholson, chief engineer of the Chicago, New Orleans & Texas Pacific Railroad, on June 20, 1904, stated that B. M. Y₁, near *Kings Mountain, Ky.*, would probably be destroyed soon by improvements.

Pages 722 and 723. The following additional notes and corrections to bench marks along the Hudson River were furnished by J. B. Miller, Assistant, Coast and Geodetic Survey:

V. O. 9.—*Cold Spring, N. Y.*, just at the north end of a rock cut and 6 feet east of east main track and 0.4 foot above the rails.

Ik'.—Near *Fishkill, Dutchess County, N. Y.*, 37½ rods south of milepost 59, at the south end of a rock cut, 20 feet west of the west main track, 55 feet north of a block signal, 4 feet above the rails; a step cut in a broad sloping rock.

R. R. 118.—*Fishkill, N. Y.*, 6 feet east of east main track.

Ii'.—*New Hamburg, Dutchess County, N. Y.*, 37 meters north of the station, 64 meters north of Main Street, 2 meters west of the center of the west track, on an irregular rock 12 meters south of the entrance to a rock cut leading to a tunnel, 0.2 meter above the rails; the east edge of a shallow drill hole surrounded by a rude triangle.

Ig'.—*Poughkeepsie, N. Y.*, on the north face instead of the east face and 4 meters west of the west main track.

Vose.—*Poughkeepsie, N. Y.*, the northern and higher one of the similar crosses near together.

R. R. 162.—Near *Hyde Park, N. Y.* Not found in 1905.

Pages 722, 723. Mr. R. E. Dougherty, engineer of the New York Central & Hudson River Railroad, on September 25, 1906, stated that Ih', Ig', Vose, and I₁, at *Poughkeepsie, N. Y.*, would soon be destroyed on account of rail road improvements.

Page 751. It was reported in 1907 that 17 MC, at *Morehead City, N. C.*, was destroyed.

Page 752. It was reported by Mr. W. E. Gehres, in 1913, that bench mark 111MC, at *Goldsboro, N. C.*, was destroyed.

Page 763. B. M. 25C, at *Monaca, Pa.*, was not found in 1906.

Page 774. Mr. R. B. Burchfield, on July 13, 1905, reported that F₅, at *Anthony, Kans.*, would probably soon be exposed to injury, as the Poorman Co. were building a new office and would remove the old one.

CORRECTIONS TO DESCRIPTIONS OF BENCH MARKS PUBLISHED IN PRECISE LEVELING IN THE UNITED STATES, 1903-1907.

Page 159. Bench mark E₁ is 3 kilometers east instead of 3 kilometers west of *Vienna, Clark County, S. Dak.*

INDEX TO ELEVATIONS AND DESCRIPTIONS OF BENCH MARKS.

[Alphabetical under each State and the States arranged in alphabetical order.]

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Covington.....	95			622		Long Run.....	157	292			
Crecelius.....	154	266, 267				Louisville.....	153, 157	264, 265, 290, 292, 293			
Crescent Springs.....	95			622		Louisville to Cairo, Ill.....	153-155	264-279			
Crittenden.....	95			623		Louisville to Georgetown.....	157	291-293			
Cypress Bend.....	155	273			626	Louisville to Mitchell, Ind.....	157	289, 290			
Danville.....	95					Ludlow.....	95, 98				665
Dekoven.....	155	275				Lyndon.....	157	292			
Diamond Island.....	155	273				McDonalds Landing.....	155	273			
Dittoes Landing.....	154	266				McKinney.....	95			627	
Dixon.....	95			622		Mason.....	95			623	
Donerail.....	95			624		Moreland.....	95			626, 627	
Dry Ridge.....	95			623		Newport.....	95			622	
Dutch Bend.....	154	272				Nicholasville.....	95			625	
Duvall.....	157	291				Norwood.....	95			628	
East Cairo.....	91, 155	279			598	Ogden.....	155	278			
Eastwood.....	157	292				Owensboro.....	154	271			
Elkhorn.....	157	291				Paducah.....	155	277, 278			
Erlanger.....	95			622		Peckenpau.....	154	266			
Eubank.....	95			627		Pine Knot.....	95			629	
Faulconer.....	95			626							
Field Station.....	157	292									

¹ See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Pyrois Island.....	155	276				Stamping Ground.....	157	291			
Pulaski.....	95			627		Stedmantown.....	157	291			
Puppy Creek, mouth of.....	154	271				Stephensport.....	154	268			
Ragland.....	155	278				Strunk.....	95			629	
Raleigh.....	155	274				Switzer.....	157	291			
Richwood.....	95			622		Tolu.....	155	275, 276			
Rock Haven.....	154	265, 266				Uniontown.....	155	274			
Rodgers Gap.....	95			624		Valley Station.....	153	265			
Sadleville.....	95			624		Wabash Island.....	155, 156	274, 284			
St. Matthews.....	157	292				Walton.....	95			623	
Science Hill.....	95			627		Warwick Villa.....	157	292			
Scotts Station.....	157	292				Waynesburg.....	95			627	
Scuffletown.....	154	271, 272				Weston.....	155	275			
Shelbyville.....	157	292				West Point.....	153, 154	265			
Sherman.....	95			623		Whitley.....	95			629	
Simpsonville.....	157	292				Wickliffe.....	91				598
Skillman.....	154	269				Williamstown.....	95			623	
Slim Island.....	155	274				Wilmore.....	95			623	
Sloans Valley.....	95			628		Wolf Creek.....	154	267			
Smithland.....	155	277				Worshams Landing.....	116				715
Somerset.....	95			628							

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Acme.....	112	294	131	681	Camptl.....	112			671
Acme to Barbin Landing.....	112				Carpenter.....	111			676
Acme to Jonesville.....	112			681	Carrollton.....	114	134	607, 608	603, 667
Alabama Landing.....	112			684	Cash Plantation.....	111			670
Albany Point.....	112			681	Caspiana Landing.....	111			670
Alden Bridge.....	113		134		Catahoula Shoals.....	112			678
Alexandria.....	112		130	672	Celestine Plantation.....	114	136		
Allen Green.....	111			669	Charlieville.....	112	132		
Alto.....	112		132		Chef Menteur.....	114		606	
Anchor.....	115			616	Cheniere.....	111			669
Arbroth.....	115			615	Choudrant.....	111			670
Arcadia.....	111			669	Clayton.....	112	294		680
Archibald.....	112	294		679	Coles Landing.....	112			678
Archibald to Columbia.....	112		132		Colfax.....	112			672
Archibald to Concordia.....	112			679-681	College Landing.....	114		135	
Archibald to Rayville.....	112			679	Colomb.....	114		610	
Ashwood.....	116		144		Columbia.....	112		132	676
Bank Smith Place.....	112			682	Columbia to Archibald.....	112		132	
Barbin Landing.....	112		131		Columbia to Jonesville.....	112			672-679
Barbin Landing to Acme.....	112		131		Columbia to Monroe.....	112			677, 678
Barbin Landing to Shreveport.....	111-112			670-673	Concordia.....	112	294		676, 679
Barbin Landing to Smithland.....	112			673-675	Concordia to Archibald.....	112			680, 681
Barre Landing.....	112			674	Concordia to Jonesville.....	112			679-681
Barnes.....	111			675	Concordia to Vidalia.....	112			679
Baskin.....	112	294		679	Convent.....	114		610	676, 677
Baton Rouge.....	114			611, 612, 613	Copeland.....	112	294		
Baton Rouge to New Orleans.....	114		134-136	607-612	Cottingham Landing.....	112			680
Baton Rouge to Smithland.....	114-115			612-619	Coushatta.....	111			678
Bayou Bartholomew.....	113	294		689, 690	Crew Lake.....	111			671
Bayou D'Arbonne.....	113	294		683	Crichtons Plantation.....	111			675
Bayou Dorcheat.....	111			670	Crowville.....	112		131	671
Bayou Macon.....	111	293		676	Curtis.....	111		131	
Bayou Sara.....	115		616, 617		Cypress City.....	112	294		680
Bayou Stord.....	112			682	Dallas.....	111			676
Belle Helene.....	114			610	Danville.....	112			678
Benton.....	113		134		David Ferry.....	112			673
Big Creek.....	112	294		679	Delhi.....	111, 112		131	676
Black Hawk.....	115		136	608	Delhi to Tensas River.....	112		131	
Black River.....	112	294		679	Delta.....	111, 116	293	145, 146	610, 636
Blankston.....	112			677	Devall.....	114, 115		614, 615	
Bodeau.....	111			668-670	Doyle.....	111			670
Bodeau to Monroe.....	111				Dubberly.....	111		131	669
Boeuf River.....	112		132		Duck Port Plantation.....	111			610
Bonita.....	113	294		690	Dunns Landing.....	112			671
Bonniers Plantation.....	111			670	East Point.....	111			671
Bougere.....	116		137	608	Eden.....	112	294		674
Boyce.....	112			672	Egg Bend Landing.....	112	293	130	673
Brooks.....	115			618	Elam.....	112	294		680
Bullitt Bayou.....	115		140, 141		Elcho Plantation.....	111			683
Burke.....	112	294		679	Ennis.....	115		619	
Burnside.....	114			610	Eva.....	112	294		681
Burtville.....	114			611	Fairchilds Island.....	115		141	
Buxtons Landing.....	112			672	Fairmount.....	112			672
Cabin Teale Plantation.....	111			610	Fairview.....	115		137	
Cathoun.....	111			669	Farmerville.....	113	294		683
California.....	111			675	Farmerville to Glendora.....	113			683
Campo Bello Plantation.....	111			670	Fish Pond.....	115		137, 138	
					Fishtrap Shoals.....	112			683
					Florence.....	112	294		680

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		Pages.	Pages.	Pages.	Pages.				Pages.	Pages.	Pages.	Pages.	
Fort Macomb.		114					New Light.		112		131		
Frank Pierre Creek.		112			684		New Light to Gilbert.		112		131		
Frogmore.		112			679		New Orleans.		114		134	606, 607	603, 608
Garyville.		114		135			New Orleans to Baton Rouge.		114		134-136	607-612	
Geismar.		114			610		New Orleans to Biloxi, Miss.		114			604-607	
Gibbsland.		111			669		New River.		114			610	
Gibsons Landing.		112	294		609, 678		Nichols.		130			786	
Gilbert.		112	294		680		Nocks.		115		136		
Gilbert to New Light.		112		131			Normands Landing.		112				673
Girard.		111			675		Old River.		112				671
Glendora.	112, 113				809		Omega.		111				611
Glendora to Farmerville.		113			683		Osbornes Ferry.		112		131		
Goldman.		115		142			Parkeville.	112, 113					682
Gordon.		111			675		Parkeville to Camden, Ark.	112-113					683-686
Grand Bend.		112	293		672		Parkeville to Monroe.	112					682
Greenville.		112	294		680		Parkeville to Wilkersons Landing, Miss.		113				689-691
Greenwood.		130			786		Patterson Plantation.		114		135		
Griffin.		116		145			Pecan Grove Plantation.		114		135		
Hahnville.		114			608		Peek.		112	294			680
Hamburg.		112			674		Plain Dealing.		113		134		
Hardscramble Landing.		112	294		681		Point Breeze.		115			620, 621	
Hard Times Landing.		116		143, 144			Pointe Coupee.		115			617	
Harrisonburg.		112			678, 679		Point Pleasant.		116		144		683
Haughton.		111			670		Poland.		112				673
Helena.		112	294		680		Port Union Landing.		113	294			683
Hendersons Landing.		111			611		Pullaway Landing.		112		131		
Hendersons Mill.		112			681		Quebec.		111				676
Hermitage.		115			615, 616		Raccourcl.		115			619	
Hester.		114		135	609	604, 605	Rapides.		112				672
Holly Grove.		112		132			Rayville.		111	294			675, 679
Holly Grove Landing.		112		132			Rayville to Archibald.		112				679
Holly Ridge.		111			676		Rayville to Monroe.		111				675
Howard.		111			670		Rayville to Vicksburg, Miss.		111				675, 676
Hurricane Bluff.		113		134			Red River Landing.		115			620	675
Jeters Landing.		112			682		Riverside Plantation.		111				610
Jeters Landing to Shreveport.		112			681, 682		Riverton.		112				678
Jewella.		130			786		River View Plantation.		111				610
Jones.		113	294		690		Rock Row Shoals.		112				682
Jones Bayou.		112	294		681		Ruston.		111		131		669
Jones Quarter Landing.		112			672		St. Gabriel.		111				
Jonesville.		112			679		St. Joseph.	115, 116			142, 143		610
Jonesville to Acme.		112			681		St. Maurice.		112				671
Jonesville to Columbia.		112			678, 679		St. Peters.		114		135		
Jonesville to Concordia.		112			679		St. Rose.		114			608	
Kenner.		114		135			Sarpy.		114		135		
King.		116		144, 145			Scotts Bluff.		113	294			683
Kirks Ferry.		112	294		680		Sellers.		114			609	604
Lacour.		115			619		Shiloh Shoals.		112				684
Lake One.		111			676		Shreveport.	{ 111, 113 } 130		293	131, 134	787	670
Landerneau.		112		132			Shreveport to Barbin Landing.		111-112				670-673
La Place.		114		135			Shreveport to Camden, Ark.		113		133, 134		
L'Argent.		115		141			Shreveport to Fort Worth, Tex.		129, 130			782-787	
Lee Bayou.		112	294		680		Shreveport to Jeters Landing.		112				681, 682
Lindgrove Landing.		113	294		690		Sibley.		111				669
Lobdell.		114			614		Simmesport.		112	293			674
Loggy Bayou.		111			671		Simsboro.		111				669
Logtown.		112			677		Smithland.	112, 115			131	619, 620	607
Lotus Landing.		111			670		Smithland to Barbin Landing.		112				673-675
Lums.		112	294		681		Smithland to Baton Rouge.	114-115				612-619	
Lutcher.		114		135	609		Smithland to Fort Adams, Miss.		115			619-622	
McClures Landing.		112	294		681		Stafford.		112				678
Mahod.		115		141			Steeles Switch.		112	294			679
Mangham.		112	294		679		Steins Bluff.		113	294			683
Mansura.		112			673		Sunrise Landing.		112		131		
Marksville.		112		131			Sunshine.		114			611	605
Merrick.		112			674		Tallulah.		111				676
Miles.		114		136			Tarbert (Miss.), opposite.		115			620	
Mill Bayou.		112			683		Taylor.		111				669
Millers Bluff.		113		134			Tensas River to Delhi.		112		131		
Millikens Bend.		111			610		Tiger Island.		112				671
Monroe.	111, 112				668, 669		Torras Landing.		112				675
Monroe to Bodeau.		111			668-670		Trinity.		112				679
Monroe to Columbia.		112			677-678		Upper Brownsville Plantation.		111				671
Monroe to Parkeville.		112			682		Vanceville.		113		134		
Monroe to Rayville.		111			675		Vick.		112		131		
Montgomery.		112			672								
Mooringport.		112			682								
Moreauville.		112			674								
Morganza.		115			618								
Morville.		115		138									
Mound.		111			675								
Mound Landing.		113	293, 294		690								
Mount Airy.		114			609								
Murrays Landing.		112		131									
New Era.		112		294		681							

¹ See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Vidalia to Concordia.....	112				676, 677	Waverly.....	111				676
Vidalia to Fort Adams, Miss.....	115		136-140			West Baton Rouge.....	114			613, 614	
Vidalia to Vicksburg, Miss.....	115-116		140-146			West Monroe.....	111				669
Walls.....	115			615		Whitehall.....	114		136		
Wards Ferry.....	113				690	Williamsport.....	115			619	
Waterproof.....	115		141, 142		609	Willow.....	112				671
						Winnsboro.....	112	294			679
						Wisner.....	112	244			680

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Adamstown.....	141		220			Hancock.....	108				561
Alberton.....	140		218			Hancock to Cumberland.....	108, 128			734-737	561
Alexandria Junction.....	140		215			Hancock to Hagerstown.....	108				560, 561
Altamont.....	143		237			Hancock to Washington Junction.....	128			730-734	
Ammdendale.....	140		216			Hanover.....	140		216		
Annapolis.....	92			642, 643		Harwood.....	140		216		
Annapolis Junction.....	140		216			Henryton.....	140		218		
Annapolis to Washington, D. C.....	92			642, 643		Hollofield.....	140		218		
Baltimore.....	140		216, 217			Hoods Mills.....	141		218		
Baltimore to Relay.....	140		216, 217			Hutton.....	108, 144		238		562
Barnesville.....	128			730		Ilyattsville.....	140		215		
Bartholows.....	141		219			Ijamsville.....	141		219		
Beltsville.....	140		216			Ilchester.....	140		217		
Berwyn.....	140		215			Jessups.....	140		216		
Black Bear.....	143		237			Keedysville.....	111				628
Black Oak.....	143		236			Kensington.....	128			729	
Bloomington.....	108, 143	203	237			Knoxville.....	128			731	
Bond Station.....	143		237			Lansdowne.....	140		216		
Bowie.....	92			643		Laurel.....	140		216		
Boyd.....	128			730		Lime Kiln.....	141		219		
Brady.....	143		236			Linden.....	128			729	
Branchville.....	140		215			Little Orleans.....	108				561
Bridewell.....	140		216			Lowndes.....	143		236		
Brunswick.....	128			731		McKenzie Station.....	143		236		
Buckeystown.....	141		219			Marriottsville.....	140		216		
Buckeystown Station.....	141		219			Monrovia.....	141		219		
Buck Lodge.....	128			730		Montevideo.....	140		216		
Capitol View.....	128			729		Morgan.....	141		218		
Catoctin.....	128			731		Mountain Lake Park.....	144		237, 238		
Cedar Cliff.....	143		236			Mount Airy Junction.....	141		219		
Cherry Run.....	108				561	Mount Savage Junction.....	128			737	
Clopper.....	128			729		Mount Winans.....	140		217		
College Park.....	140		215			Muirkirk.....	140		216		
Contee.....	140		216			North Branch.....	128			736	
Croftree.....	143		237			Oak Crest.....	140		216		
Cresap.....	143		236			Oakland.....	108, 144	293	238		562
Cumberland.....	108, 128, 143		236	736, 737	561	Oella.....	140		218		
Cumberland to Amblersburg, W. Va.....	108, 143, 144		236-238		561, 562	Oldtown.....	108				561
Cumberland to Foley, Pa.....	128			737, 738		Orange Grove.....	140		217		
Cumberland to Hancock.....	108, 128			734-737	561	Pinto.....	143		236		
Darby.....	128			730		Plane No. 4.....	141		219		
Davis.....	140		218			Point of Rocks.....	111			730	627
Dawson.....	143		236			Potomac Station.....	143		236		
Deer Park.....	108, 143		237		562	Rawlings.....	143		236		
Derwood.....	128			729		Reels Mill.....	141		219		
Dickerson.....	128			730		Relay.....	140		216, 217		
Dorsey.....	140		216			Relay to Baltimore.....	140		216, 217		
Doubs.....	141		220			Relay to Washington, D. C.....	140		215, 216		
Elk Ridge.....	140		216			Relay to Washington Junction.....	140, 141		217-220		
Ellerslie.....	128			737		Riverdale.....	140		215		
Ellicott City.....	140		218			Rives.....	140		215		
Evitts Creek.....	128			736		Robert Station.....	143		236		
Frankville.....	143		237			Rockville.....	128			729	
Frederick.....	141		219			St. Denis.....	140		216		
Frederick Junction.....	141		219			Savage Station.....	140		216		
Gaither.....	140		218			Seneca.....	111				627
Gaithersburg.....	128			729		Silver Spring.....	128			729	
Garrett Park.....	128			729		Skipnash.....	144		238		
Germantown.....	128			729, 730		Sunnyside.....	140		215		
Gorsuch.....	140		218			Swanton.....	143		237		
Gray.....	140		218			Sykesville.....	140		218		
Great Falls.....	111				627	Tuscarora.....	128			730	
Hagerstown.....	108				560	Vineyard.....	140		217		
Hagerstown to Georgetown, D. C.....	111				627, 628	Ward.....	128			729	
Hagerstown to Hancock.....	108				560, 561	Waring.....	128			729	
Hagerstown to Harrisburg, Pa.....	108				560	Washington Grove.....	128			729	
Halethorpe.....	140		216			Washington Junction.....	128, 141		220		730
Halpine.....	128			729		Washington Junction to Hancock.....	128			730-734	
						Washington Junction to Relay.....	140, 141		217-220		

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Watersville.	141		218, 219			Wilson.	92				643
West Baltimore.	140		216			Windham.	128			729	
Westmore.	128			729		Woodbine.	141		218		
Weyerton.	111, 128			731	628	Woodside.	128			729	
Whites Ferry.	111				627	Woodstock.	140		218		

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Algonac.	98			845, 846		Maple Ridge.	98				791
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Barbeau.	98		648			Marquette.	98			651	791
Bay Mills.	98		650			Marquette to Escanaba.	98			651	791
Brimley.	98		650			Marysville.	98				847
Delray.	98			843		Monroe.	97				654
Detour.	98		645, 646			Mount Clemens.	98				844
Detour to Iroquois.	98		645-651			New Baltimore.	98				845
Detroit.	98		644	842-844		New Haven.	99				842
Detroit Junction.	98			842		Newport.	97				653
East China.	98			846		Pine River.	99				842
Ecorse.	98		644	843		Port Huron.	98				847
Escanaba.	98			791		Raber.	98			646, 647	
Escanaba to Marquette.	98		651	791		Roberts Landing.	98				846
Fair Haven.	98			845		Rosedale.	98			648	
Fort Gratiot.	98			842		Roseville.	98				844
Gatesville.	98		647			St. Clair.	98				846
Gibraltar.	98			653		Sand Beach.	98			651, 652	
Gibraltar to Deshler, Ohio.	97			653-656		Sands.	98				791
Gibraltar to Trenton.	98		644	842, 843		Sault Sainte Marie.	98			648-650	
Grossepoint.	98			844		Schlesser.	98			646	
Grossepoint Farms.	98			845		Sibleys.	98				843
Iroquois Point.	98		651			South Rockwood.	97				653
Iroquois to Detour.	98		645-651			Stalwart.	98			647	
Kelden.	98		647			Sterlingville.	98			647	
Lakeport.	97		644	842		Trenton.	98				842, 843
La Salle.	98			654		Trenton to Gibraltar.	98			644	842, 843
Lexington.	98		644, 645			Trenton to Lexington.	98			644	842-847
Lexington to Trenton.	98		644	842-847		Vienna.	97				654
McCarron.	98		648			Windmill Point.	98				844
Mackinaw.	98		652			Wyandotte.	98				842, 843

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Ada.	136		170			Cedar Brook, mouth of.	120				785
Aitkin.	120, 122		146		785	Centerville.	122				789
Aitkin to Brainerd.	120				783-785	Central Point.	117				745
Aitkin to Grand Rapids.	122		146-148			Childs.	134		153, 154		
Albany.	134		149			Clearwater.	120				779
Alexandria.	134		151, 152			Clinton.	134		156		
Angus.	136		171			Cohasset.	121			596	
Anoka.	120			776, 777		Collegeville.	134		149		
Argyle.	136		171			Collis.	134		155		
Ashby.	135		167			Crawford.	136		169		
Averill.	136		169			Crookston.	136		170, 171		
Avon.	134		149			Cuba.	121			593	
Backus.	121			587		Dakota.	118				753
Bald Eagle Junction.	122				789	Dalton.	135		167, 168		
Ball Club.	121			595		Daytons Bluff.	117				738
Barnesville.	136		169			Dean Brook.	120				784
Barnum.	122			786		Deer River.	121			595, 596	
Bear Island.	120			779		Downer.	136		169		
Belle Prairie.	120			782		Dresbach.	118				753, 754
Beltrami.	136		170			Duluth.	122				785
Bemidji.	121			592		Duluth to St. Paul.	122				785-790
Bena.	121			594		Dumont.	134		155		
Blackberry.	122		148	597		Dutchmans Coulee.	118				747
Bonup.	136		169, 170			East St. Cloud.	120, 134		148		779
Brainerd.	120			585	783	Elbow Lake.	134		152, 153		778
Brainerd to Aitkin.	120				783-785	Elk River.	120				
Brainerd to Cass Lake.	120, 121			586-590		Erdahl.	134		152		
Brainerd to St. Cloud.	120				779-783	Euclid.	136		171		
Brandon.	134		152			Evansville.	134, 135		152, 167		
Brook Creek.	122			788		Evansville to St. Cloud.	134		148-152		
Browns Hill.	122			788		Evansville to Stephen.	135-136		167-172		
Carlisle.	136		168			Evansville to Watertown, S. Dak.	134-135		152-158		
Carlton.	121			786		Farris.	121			590	
Cass Lake.	121			590, 593		Felton.	136		169		
Cass Lake to Brainerd.	120-121			586-590		Fergus Falls.	136		168		
Cass Lake to Grand Rapids.	121-122			593-598		Florence.	117				745
Cass Lake to Lake Itasca.	121			590-593							

¹ See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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Forest Lake.....	122				789		Ortonville.....	134		150, 157			
Fort Ripley.....	120				782		Osakis.....	134		150, 151			
Freeport.....	134		149				Otsego.....	120				778	
Fridley.....	120				776		Parkdale.....	136		168			
Garfield.....	134		152				Pequot.....	120			586		
Gladstone.....	122				790		Pine City.....	122				788	
Glyndon.....	136		169				Pine River.....	120, 121			586	784	
Graceville.....	134		155, 156				Point Douglas.....	117				741	
Grand Rapids.....	121			597			Pohegama Lake.....	121			590, 597		
Grand Rapids to Aitkin.....	122		146-148				Portage.....	122		147			
Grand Rapids to Cass Lake.....	121-122			503-508			Prospect Hill.....	121			592		
Hackensack.....	121			587, 588			Pullman.....	117				739, 740	
Hadler.....	136		*170				Rabbit River, mouth of.....	120				784	
Harris.....	122				788		Red Rock.....	117				739	
Hastings.....	117				740		Red Wing.....	117				743, 744	
Hay Creek, mouth of.....	120				784		Reeds Landing.....	118				747	
Hennepin River, mouth of.....	121			592			Rice.....	120				780, 781	
Hereford.....	134		153				Richmond.....	118				753	
Highwood.....	117				739		River Junction.....	118				754	
Hinckley.....	122				787		Rosby.....	121		590, 591			
Homer.....	118				752		Roscoes Coulee.....	118				747	
Hubert.....	120			585			Rothsay.....	136		168			
Hull.....	121			596			Royalton.....	120				781	
Hunters.....	121			588			Rush City.....	122				788	
Island Lake.....	120, 121			587	784		Russia.....	136		170			
Island No. 1.....	120				784		St. Augusta.....	121				779	
Island No. 18.....	117				740		St. Cloud.....	120, 134		148, 149		779, 780	
Island No. 22.....	120				782		St. Cloud to Brainerd.....	120				779-783	
Itasca.....	120				777		St. Cloud to Evansville.....	134		148-152			
Jenkins.....	120			586			St. Cloud to St. Paul.....	119, 120				774-779	
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Kettle River.....	122				787		St. Paul.....	117, 119, 122				737, 738, 775, 790	
Kings Coulee.....	117, 118				746, 747		St. Paul to Duluth.....	122				785-790	
Kittson.....	136		170				St. Paul to St. Cloud.....	119, 120				774-779	
La Crescent.....	118				754		St. Paul to Savanna, Ill.....	117-119				737-774	
Lake City.....	117				746		St. Paul Park.....	117				739, 740	
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Lake Side.....	117				744, 745		Sauk Rapids.....	120				780	
Lamoille.....	118				752		Schley.....	121			593, 594		
La Prairie.....	122			597			Shirley.....	136		171			
La Salle River, mouth of.....	121			592			Short Line Park.....	122				786	
Lawndale.....	136		168, 169				Smithville.....	122				786	
Leaks.....	120			585			South Bemidji.....	121			591		
Leech Lake.....	121			589			Stacy.....	122				789	
Libby.....	122		147				Starke.....	121			595		
Little Falls.....	120				781		Stephen.....	136		171, 172			
Little Rock.....	120				780		Stephen to Evansville.....	135, 136		167-172			
Lockhart.....	136		170				Sturgeon Lake.....	122				787	
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Lothrop.....	121			588			Tenney.....	134		153			
Malthy.....	121			592			"The Rapids".....	121			592		
Melby.....	135		167				Thomson.....	122				786	
Melrose.....	134		149, 150				Thorsborg.....	134			152		
Merrifield.....	120			585			Tintah.....	134			153		
Mildred.....	121			587			Towhead Rapids.....	120				784	
Miller.....	122				787		Verna.....	122		148			
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Minneopa.....	118				752		Wacouta.....	117				744	
Mission Creek.....	122				788		Waldeck.....	122		146, 147			
Mississippi.....	122		147, 148				Walker.....	121			588, 589		
Monticello.....	120				778, 779		Warren.....	136			171		
Moose Lake.....	122				787		West Duluth.....	122				785	
Nelson.....	134		151				West Union.....	134			150		
Newport.....	117				739		Wheaton.....	134			155		
Newport Landing.....	117				739		Wheatville.....	136			170		
Nininger Slough.....	117				740		White Bear.....	122				790	
North Branch.....	122				789		Wilkinson.....	121			589, 590		
North Prairie.....	120				781		Willow River.....	122				787	
Nushka.....	121			594, 595			Winona.....	118				751, 752	
Old Crow Wing Ferry.....	120				782		Wyoming.....	122				789	
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Argyle.....	113				697	Bay St. Louis.....	114			605			
Arnot.....	115		137			Beauvoir.....	114			605			
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Austin.....	114				700	Ben Lomond Plantation.....	111					611	
Australia.....	114				694	Beulah.....	114					695	
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Biloxi to New Orleans, La.	114			604-607		Mayersville	111				611		
Blakely Plantation	113				692	Meridian	91, 93, 111				594, 640, 714		
Bolivar	114				696	Meridian to Corinth	91				594-596		
Bolton	111				638	Meridian to Mobile, Ala.	91				593, 594		
Booneville	91				596	Meridian to Vicksburg	111				636-640		
Bovina	111				638	Meridian to York, Ala.	93				713, 714		
Brandon	111				639	Mhoons Landing	114				699		
Bucatunna	91				593	Millers Bend	113				691, 697		
Buck Ridge	114				696	Mississippi City	114			605	601, 668		
Bugs Landing	97			643	708	Morton	111				639		
Burnsville	96, 97				700	Mound Place	113				696		
Calmar	113				692	Natchez	112, 115	293	139, 140		677		
Carsons	114				695	Nebblets Landing	114				695		
Childers	113				696	Newmans	111				638		
Chinchuba	114			606		Newton	111				640		
Chunky	111			606	640	Ocean Springs	91, 114			604	592		
Claiborne	114					Offutt's Landing	113				691, 697		
Clarksburg	111				639	Okolona	91				595		
Clarksdale	114	294			698	Palmetto Plantation	111				611		
Clarksdale to Friar Point	114			697, 698		Pass Christian	114			605	601		
Clarks Landing	114				695	Pearson	111				639		
Clinton	111				638	Pelahatchee	111				639		
Clover Hill	114	294			697	Port Anderson	113				691, 697		
Coahoma	114	294			697	Prentiss	114				695		
Commerce	114				699	Quitman	91				594		
Concordia	114				695	Rankin	111				639		
Content	114				696	Refuge	111				612		
Corinth	91, 97			643, 644	596, 700	Refuge Plantation	111				612		
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Corinth to Memphis, Tenn.	111				641, 642	Rienzi	91				596		
Corinth to Meridian	91				594-596	Riverdale Plantation	111				695		
Corinth to Tuscumbia, Ala.	96, 97			642-644	700-702	Riverton	114				611		
De Soto	91				594	Robinsonville	114				694		
Edwards	111				638	Rodney	115		142, 143				
Enola	113				692	Rosedale	114				695		
Enterprise	91				594	Russell	93				714		
Forest	111				639	Saltillo	91				595		
Fort Adams	115	294		621		Satartia	113				692		
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Friar Point to Clarksdale	114				697, 698	Shubuta	91				594		
Friar Point to Memphis, Tenn.	114				698-700	Sidon	113				693		
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Glendale	114				698	Star Landing	114				699		
Glenora Plantation	111				612	Stoneville	113				694		
Graham	111				640	Stormville	114				696		
Greenfield	111				639	Sunflower Landing	114				694		
Greenville	111, 113				612, 691, 697	Tallulah Landing	111			620	611		
Greenville to Vicksburg	111				610-612	Tarbert (opposite, in La.)	115				693		
Greenville to Vicksburg via Greenwood	113				692-694	Tchula	113				695		
Greenville to Wilkersons Landing	113				691-697	Terrene	114				695		
Greenwood	113				693	The Bogue	113				694		
Guntown	91				595	Toomsaba	93				714		
Hays	111				611	Tupelo	91				595		
Heathman	113				694	Verona	91				595		
Hickory	111				640	Vicksburg	111, 113, 116		294	130, 146	636, 637, 692		
Horn Lake Creek	114				699	Vicksburg (Delta)	111, 116				610		
Hughes Landing	114				694	Vicksburg to Greenville	111				610-612		
Indian Creek	97				708	Vicksburg to Greenwood	113				692-694		
Indianola	113				693	Vicksburg to Meridian	111				636-640		
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Iuka	96				700	Warfield Point	111				612		
Jackson	111				639	Waveland	114				606		
Kleinston	111, 116		146		637	Waynesboro	91				593		
Lake	111				640	West Point	91				595		
Lake Charles Landing	114				694	White Harbor	114			605	601		
Lake See	111				612	Wilkersons Landing	113				696		
Lake Washington Landing	111				612	Wilkersons Landing to Friar Point	113, 114				694-696		
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Leota	111				611, 612	Wilkersons Landing to Greenville, La.	113				689-691		
Longwood Plantation	111				612	Winchester	91				593		
Lyon	114	294			698	Yazoo City	113				692		
Macon	91				594, 595	Yazoo River	113				692		

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Adrian.....	110				624	Grays Creek.....	122				808
Alexandria.....	116				724	Grays Point.....	91				723
Allenton.....	91				567	Greenwood.....	109				574
Amazonia.....	125				833	Gregory Landing.....	116				724
Arehle.....	110				625	Gumbo.....	111				744
Arthur.....	110				624	Halls.....	124				831
Ashburn.....	116				725	Hannibal.....	116			808	725
Atherton.....	124				823	Harrisonville.....	110				625
Bainbridge Creek.....	93				722	Harrisonville to Boston.....	110				625-625
Becker.....	94				795	Harrisonville to Holliday, Kans.....	110, 111				625-627
Belton.....	110				626	Harrisonville to Pleasant Hill.....	110				625
Berger.....	91, 94				568, 800	Hermann.....	91, 94				568, 800, 801
Berlin.....	123				820	Hilton.....	116				725
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Bigelow.....	125				834	Horton.....	110				624
Birmingham Point.....	93				722	Illinois.....	93				720
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Bluffport.....	123				815	Irwin.....	110				623
Bols Brulé.....	93				721	Isbell.....	91, 95				570, 805
Boles.....	94				795, 796	Jamestown Landing.....	91				722
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Bonnets Mill.....	91, 95				570, 805	Jefferson Barracks.....	93				720
					812, 813	Jefferson City.....	91, 95, 122				570, 571, 800-808
Boonville.....	123				814	Jefferson City to Kansas City.....	122-124				807-825
Boston.....	110				622, 623	Jefferson City to Pleasant Hill.....	109				570-574
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Boston to Harrisonville.....	110				623-625	Jefferson City to St. Louis.....	91				567-570
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Bull Rock.....	122				809	Kansas City.....	109, 124				575, 824, 825
Butler.....	110				624	Kansas City to Holliday, Kans.....	109				575, 576
California.....	109				571	Kansas City to Jefferson City.....	122-124				807-825
Cambridge.....	123				816	Kansas City to St. Joseph.....	124, 125				574, 575, 825-832
Canton.....	116				724, 725	Kenmoor.....	124				831
Cape Girardeau.....	93				723	Kent.....	94				798
Cape Girardeau County.....	93				722	Kimmiswick.....	93				720
Cape Rock.....	93				722	Kimpton.....	110				625
Carondelet.....	111				720	Kingsville.....	109				574
Carthage.....	110				622	Knobnoster.....	109				573
Centaur.....	93				794	Labadie.....	94				700
Centertown.....	109				571	La Grange.....	116				725
Center View.....	109				574	Lamar.....	110				623
Chamois.....	91, 94				569, 803	Lamonte.....	109				573
Charbonnier Point.....	93				804	Langdon.....	125				835
Clarksburg.....	109				792	Laynesville.....	123				818
Clarksville.....	116				572	Lees Summit.....	109				574
Claysville.....	122				726	Lexington.....	123, 124				820, 821
Cliff.....	93				809	Lisbon.....	123				814, 815
Cliff Cave.....	93				720, 721	Little Blue.....	109				575
Cold Water Creek, mouth of.....	93				720	Little Blue River.....	124				823
Cole.....	109				791	Lone Tree.....	110				625
Coleman.....	110				571	Loose Creek.....	95				805
Columbia Bottom.....	93				626	Louisiana.....	116				726
Commerce.....	93				791	Malta Bend Landing.....	122, 123				818
Corning.....	125				723	Marion.....	122, 123				809, 810
Courtney.....	124				834, 835	Matthews Landing.....	124				822
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Creve Coeur Lake.....	93				834	Milo.....	110				623
Cromwell Point.....	123				793, 794	Missouri City.....	124				831
Curzons.....	125				816	Mona.....	93				794
Deer Creek.....	94				804	Monett.....	110				621
Dewitt.....	123				817	Moniteau Creek.....	123				810
Dover.....	123				819, 820	Montserrat.....	109				573
Drew.....	93				794	Morrison.....	91, 94				569, 803
Dundee.....	94				798, 799	Mount Vernon Landing.....	123				792
East Atchison.....	124				830	Musics Ferry.....	93				834
Edwards.....	123				819	Napier.....	125				822
Elliott's Landing.....	123				812	Napoleon.....	124				623
Elston.....	109				571	Nevada.....	110				816
Etiah.....	91, 94				568, 799	New Frankfort.....	123				568, 799
Ewing's Landing.....	95				800	New Haven.....	91, 94				823
Exeter.....	110				806	New Sibley.....	124				835
Fabius River.....	116				621	Nishnabotna.....	125				833
Forbes.....	125				725	Nodaway.....	125				820
Forest City.....	125				833, 834	Northrup.....	123				570, 806
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Fortuna.....	109				572						
Franklin.....	123				813						
Franklin Island.....	123				812						
Gasconade.....	91, 94				568, 569						
Geigers Landing.....	123				801, 802						
Glasgow.....	123				810, 811						
Grand Eddy.....	93				815, 816						
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	Pages.	Pages.	Pages.	Pages.	Pages.		Pages.	Pages.	Pages.	Pages.	Pages.
Otterville.....	109				572	St. Marys.....	93				721
Overton.....	123				811	St. Paul.....	91				567
Passaic.....	110				824	Salt Creek.....	123				816
Phelps.....	125				835	Sandy Hook Landing.....	123				810
Pierce City.....	110				621	Sarcozie.....	110				622
Platin Rock Creek.....	93				720	Saverton.....	116				725
Pleasant Hill.....	109, 110				574	Scott.....	109				571
Pleasant Hill to Harrisonville.....	110				625	Sedalia.....	109				573
Pleasant Hill to Jefferson City.....	109				570-574	Seligman.....	110				621
Pleasant Hill to Kansas City.....	109				574, 575	Sheldon.....	110				623
Port Royal.....	93, 94				795	Shipley Landing.....	94				804, 805
Purdy.....	110				621	Sibley.....	124				822
Quarrytown.....	93				721	Sibley Bridge.....	124				822
Raymore.....	110				626	Smithton.....	109				572
Reeds.....	110				622	South Point.....	91, 94				568, 796,
Rich Hill.....	110				624	Stanleys Landing.....	122				797
Richland Creek.....	123				815	Stevens.....	93				809
Rocheport.....	123				811	Strasburg.....	109				794
Rush Tower.....	93				720	Sugar Loaf Rock.....	122				574
Rushville.....	124				830	Sulphur Springs.....	93				809
St. Albans.....	94				795	Syracuse.....	109				720
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		This publication.	Precise leveling in the U. S. 1903-1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.				This publication.	Precise leveling in the U. S. 1903-1907.	Rept. 1903, App. 3.	Rept. 1899, App. 8.	
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¹ See discussion on page 158 in regard to elevations of rail in front of railroad stations.

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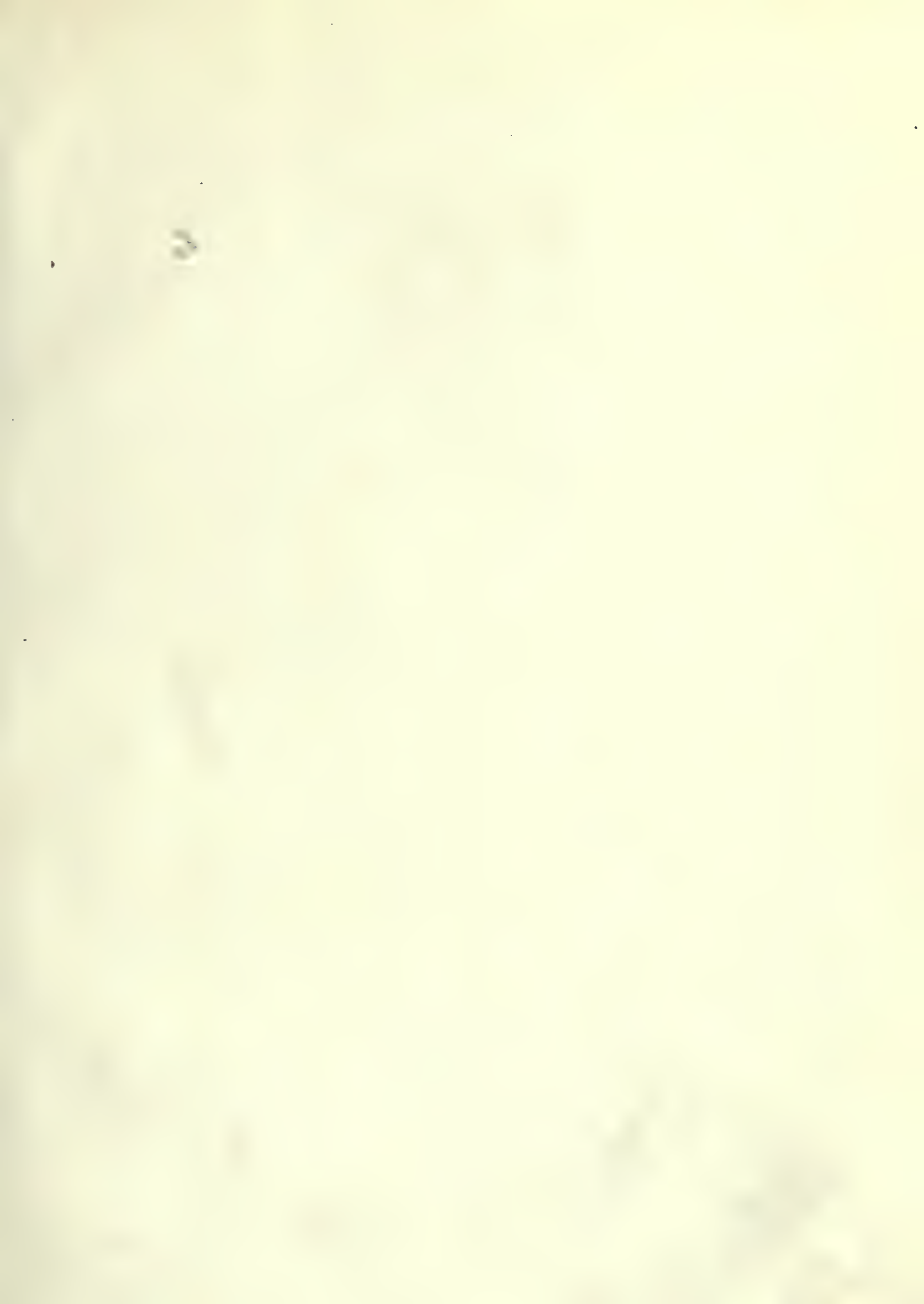
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